Vol. I

TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1938

No. 466

HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION, PETITIONERS,

vs.

ERLE P. HALLIBURTON AND HALLIBURTON OIL WELL CEMENTING COMPANY

No. 479

ERLE P. HALLIBURTON AND HALLIBURTON OIL WELL CEMENTING COMPANY, PETITIONERS,

vs.

HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

PETITION FOR CERTIORARI FILED NOVEMBER 8, 1938.
PETITION FOR CERTIORARI FILED NOVEMBER 18, 1938.

CERTIORARI GRANTED DECEMBER 19, 1938.

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INDEX.

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Index to Exhibits

Defendants' Exhibits

[fol. 1] Names and addresses of solicitors omitted in printing.

[fols. 2-3] Citation, in usual form, showing service on K. K. Wright, filed January 26, 1937, omitted in printing.

[fol. 4]

IN UNITED STATES DISTRICT COURT, SOUTHERN DISTRICT OF CALIFORNIA, NORTHERN DIVISION

In Equity. No. D-56

In Infringement of Letters Patent No. 1.930.987

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY, a Corporation, Plaintiffs,

vs.

HONOLULU OIL CORPORATION, LTD., a Corporation and M. O. Johnston Oil Field Service Corporation, a Corporation, Defendants

BILL OF COMPLAINT—Filed November 3, 1933

To the Honorable the Judges of the United States District Court for the Southern District of California, Northern Division:

Erle P. Halliburton and Halliburton Oil Well Cementing Company, a corporation, plaintiffs herein, bring this their Bill of Complaint against the defendants, Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation for acts of infringement of Letters Patent committed and threatened to be committed within the Southern [fol. 5] District of California, Northern Division, and elsewhere, and Plaintiffs Complain and Allege as Follows:

I

That Plaintiff, Erle P. Halliburton, is an inhabitant of the State of California, residing at Los Angeles, in said State, and within the Southern District of California, and Plaintiff, Halliburton Oil Well Cementing Company, is a corporation

organized and existing under and by virtue of the laws of the State of Delaware.

II

That Defendant, Honolulu Oil Corporation, Ltd., is a corporation organized and existing under and by virtue of the laws of the State of Delaware, with a regular and established place of business in Kern County, California, within the Northern Division of the Southern District of California; that defendant, M. O. Johnston Oil Field Service Corporation is a corporation organized and existing under and by virtue of the laws of the State of California with a regular and established place of business at Los Angeles County, within the Southern District of California.

That Each of said defendants has a regular and established place of business within the Southern District of California wherein, as well as elsewhere, the defendants have committed and threatened to commit the acts of infringement of Letters Patent complained of herein.

III

That the ground upon which this Court's jurisdiction depends is that this is a suit in equity arising under the patent laws of the United States of America.

[fol. 6] IV

That heretofore, to-wit, prior to February 10th, 1926, John T. Simmons, then a resident of El Dorado, Arkansas, was the original and first inventor of a new and useful invention to-wit: Method and Apparatus for Testing the Productivity of Formations Encountered in Wells, not known or used by others before his invention or discovery thereof or patented or described in any printed publication in the United States of America or any foreign country before his invention or discovery thereof, or more than two years prior to his application for Letters Patent thereon in the United States of America, or in public use or on sale in the United States for more than two years prior to such application for Letters Patent therefor and not patented; that thereupon, to-wit, on February 10th, 1926, the said John T. Simmons made an application in writing in due form of law to the Commissioner of Patents of the United States of America for Letters Patent, in all respects with

the conditions and requisities of said application being numbered Serial No. 87,323;

That Thereafter by mesne assignment in writing the said John T. Simmons assigned, transferred and set over to the plaintiff Erle P. Halliburton, all of the right, title and interest in and to said application for Letters Patent for Method and Apparatus for Testing the Productivity of Formations Encountered in Wells, and the inventions described and disclosed therein, and requested the United States Patent Office to issue any and all Letters Patent issued on said application to plaintiff Erle P. Halliburton.

[fol. 7] V

That after due proceedings had and due examination made by the Commissioner of Patents upon the aforesaid application as to the patentability of said invention, on October 17th, 1933, Letters Patent of the United States of America No. 1,930,987, signed, sealed and executed in due from of law and bearing date the day and year aforesaid, were granted, issued and delivered by the Commissioner of Patents of the United States of America to the aforesaid plaintiff Erle P. Halliburton; that thereby there was granted and secured to the said Erle P. Halliburton, his representatives and assigns, for the full term of seventeen years from and after said October 17th, 1933, the exclusive right and liberty of making, using or vending to others to be used the said inventions throughout the United States of America and the territories thereof, all as will more fully and at large appear in and by said original Letters Patent or a duly certified copy thereof ready in court to be produced as may be required.

VI

That Plaintiff Erle P. Halliburton, by a written instrument dated and delivered on or about the 9th day of October, 1933, granted to Halliburton Oil Well Cementing Company a corporation, of the State of Delaware, for the full term of the aforesaid Letters Patent No. 1,930,987, and for the full term of and under any and all Letters Patent granted or procured on said application for Letters Patent Serial No. 87,323 filed February 10th, 1926, unless sooner terminated as in such written instrument provided, the sole and exclusive right, license and liberty to employ the inventions described and claimed in said application for Letters Pat-

[fol. 8] ent, Serial No. 87,323, and the inventions described and claimed in said Letters Patent No. 1,930,987, in and throughout the United States of America, and the territories thereof, upon the terms and conditions in said instrument set forth, including the payment of a royalty upon each and every testing job performed under said license by said Halliburton Oil Well Cementing Company to plaintiff, Erle P. Halliburton; and at all times since the 17th day of October, 1933, said Halliburton Oil Well Cementing Company was to have and now has the sole and exclusive right, license and liberty to employ said invention patented in said Letters Patent in and throughout the United States of America, and the territories thereof; that ever since the 17th day of October, 1933, plaintiff Halliburton Oil Well Cementing Company, a corporation has been and now is the owner of the exclusive license in and to any and all rights under and by virtue of said Letters Patent No. 1,930,987 for oil well testing in and for all of the United States of America and the territories thereof; and at all times since the grant of said Letters Patent No. 1,930,987, plaintiff Erle P. Halliburton has been and now is the sole and exclusive owner thereof.

VII

That upon the completion of the aforesaid invention plaintiff Erle P. Halliburton introduced the said invention to the oil well industry and proceeded to put the same into practical use for testing oil wells particularly in the States of Oklahoma, Texas, Kansas, Arkansas, Louisiana, Wyoming, Montana, New Mexico and California; and ever since Feb- [fol. 9] ruary, 1926, plaintiff Erle P. Halliburton has had invested and expended large sums of money and has been to great trouble in building up and conducting the business of testing oil wells employing the process and apparatus patented in and by said Letters Patent No. 1,930,987 in the States of Oklahoma, Texas, Kansas, Arkansas, Louisiana, Wyoming, Montana, New Mexico and California; that ever since on or about the 9th day of October, 1933, Halliburton Oil Well Cementing Company, a corporation, one of the plaintiffs herein, has had invested and expended large sums of money and been to great trouble in building up and conducting a business employing the process and apparatus patented in said Letters Patent No. 1,930,987, particularly in the states above enumerated; that the apparatus and meth-

ods patented in said Letters Patent No. 1,930,987 have come into extended and commercial use and have become the standard apparatus and processes employed in the testing of formations encountered in the drilling of oil wells throughout the oil producing fields of the United States; that said inventions have been and are of great benefit and advantage to the oil industry of the entire world.

VIII

That subsequent to the grant of said Letters Patent No. 1,930,987 the defendant Honolulu Oil Corporation, Ltd., a corporation, has infringed upon said Letters Patent by employing the processes and apparatus patented and claimed in and by said Letters Patent in the testing of formations encountered in oil wells in Kern County, in the Northern Division of the Southern District of California, and elsewhere; that said defendant, M. O. Johnston Oil Field Service Corporation has infringed upon said Letters Patent [fol. 10] by manufacturing apparatus and employing the processes patented and claimed in and by said Letters Patent and using said ap-aratus and processes in testing formations encountered in wells drilled in the County of Kern, State of California, and elsewhere; that the above named defendants have jointly and severally infringed said Letters Patent by using apparatus and employing the processes patented in and by said Letters Patent in the County of Kern, and elsewhere, in the Southern District of California; that said infringement by said defendants has been without the consent of the plaintiffs and contrary to the written protests made by plaintiffs to defendants; that said infringement has been proceeded with by said defendants with full and actual knowledge of the grant of said Letters Patent No. 1,930,987 and of the rights held therein by plaintiffs; that said infringements have been deliberate and intentional, and said defendants are now continuing in said infringement in the Northern Division of the Southern District of California, and intend to continue the same unless restrained by this Court; that plaintiffs do not know exactly the number of tests of formations encountered in wells in which defendants have infringed said Letters Patent by employing the said apparatus and processes, or the amounts of profits or damages gained by each of the defendants by said infringement; that plain-

tiffs have been seriously and irreparably damaged and injured by the infringing acts of the defendants aforesaid, and will be further seriously and irreparably damaged if said infringement be permitted to continue.

Wherefore, Plaintiffs Pray

1

That a temporary Writ of Injunction be issued out of and under the seal of this Court enjoining and restraining the defendants Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation, their agents, attor-[fol. 11] neys, servants, employees, associates, workmen and confederates, and each and every one of them, from directly or indirectly in any manner employing or using the apparatus or methods patented in said Letters Patent No. 1,930,987; and that upon final hearing of this cause, said injunction be made permanent.

2

That defendants Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation, and each of them, be Ordered, Adjudged and Decreed to account to and pay over to plaintiffs all profits and advantages realized by defendants, and each of them, from the infringement complained of herein; and all damages sustained by plaintiffs by reason of said infringement, and that the Court may increase the actual damages as assessed to a sum equal to three times the amount of such assessment in accordance with the statute in such case made and provided under the circumstances of this wilful and unjust infringement committed by the said defendants as hereinbefore set forth, together with the costs of this suit, and for such other, further or different recourse as to this Court may seem proper and in accord with equity and good conscience.

Erle P. Halliburton, Halliburton Oil Well Cementing Company, by Erle P. Halliburton, Its President.
Lyon & Lyon, Leonard S. Lyon, Henry S. Richmond, Attorneys for Plaintiffs.

[fol. 12] *Duly sworn to by Erle P. Halliburton. Jurat omitted in printing.*

[File endorsement omitted.]

[fol. 13] IN UNITED STATES DISTRICT COURT

ANSWER OF DEFENDANTS—Filed December 14, 1933

Now come Honolulu Oil Corporation, Ltd., a corporation, and M. O. Johnston Oil Field Service Corporation, a corporation, defendants above named, and answering the Bill of Complaint filed herein by plaintiffs above named, admit, deny and allege as follows:

I

Answering paragraph I of said Bill of Complaint, defendants allege that they are without knowledge of the several allegations in said paragraph contained and, therefore, leave plaintiffs to make such proof thereof as they may be advised.

II

Answering paragraph II of said Bill of Complaint, the defendant Honolulu Oil Corporation, Ltd., admits that it is a corporation organized and existing under and by virtue of the laws of the State of Delaware, but denies that it has a regular and established place of business in Kern County, California, within the Northern Division of the Southern District; defendant M. O. Johnston Oil Field Service Corporation admits that it is a corporation organized and existing under and by virtue of the Laws of the State of California, and admits that it has a regular and established place of business in the County of Los Angeles, within the Southern District of California, but the aforesaid defendants, each for themselves, deny that they, or either of them, have committed or threatened to commit any acts of infringement as alleged in said Bill of Complaint within said Southern District of California, or at any other point [fol. 14] or place, or that they have jointly or severally, at any time or at any place, infringed upon any right of plaintiffs under Letters Patent No. 1,930,987 as alleged in said Bill of Complaint.

III

Answering paragraph III of said Bill of Complaint, defendants admit that if the alleged letters patent referred to in plaintiffs' Bill of Complaint is valid, the pretended cause of action attempted to be set forth in the Bill of Complaint arises under the patent laws of the United States,

and that, therefore, this court would have jurisdiction; but denies that such letters patent is valid or legal or of any force or effect at law whatsoever.

IV

Answering paragraph IV of said Bill of Complaint, defendants deny that piror to February 10, 1926, or at any other time or at all, one John T. Simmons, then a resident of El Dorado, Arkansas, was within the m-aning of the patent laws of the United States, the inventor of a certain new and useful method and apparatus for testing the productivity of formation encountered in wells, and deny that said John T. Simmons was entitled to a patent thereon under the provisions of said patent laws, and further deny that upon said date or upon any other date said John T. Simmons did duly file in the Patent Office of the United States his application for said Letters Patent for said alleged invention, and deny that on October 17, 1933, or on any other date, Letters Patent of the United States No. 1,930,987 or any other number were granted or issued on said alleged application or on any other application to Erle P. Halliburton, and defendants not being advised except [fol. 15] by the allegation of said Bill of Complaint, leave to plaintiffs herein to make such proof thereof as they may deem advisable; and defendants, having no knowledge respecting the same, deny that said John T. Simmons did, on or prior to October 17, 1933, duly or otherwise assign his entire right, or any right, title and interest in and to said alleged Letters Patent No. 1,930,987, or to the alleged invention, or to any application made for Letters Patent, or that thereafter, or at any time, by deed of assignment duly executed and recorded in the United States Patent Office, the said alleged Letters Patent No. 1,930,987 and all or any right, title or interest therein or thereunder was transferred to the plaintiff Erle P. Halliburton, or that the plaintiff Erle P. Halliburton herein became or now is the sole and exclusive owner, or any owner, of all or any rights or privileges under said alleged Letters Patent, or that the said plaintiff Erle P. Halliburton is exclusively entitled, or in any manner entitled, to maintain this suit.

In further answer to paragraph IV of the Bill of Complaint, defendants deny that John T. Simmons was the first inventor of a new or useful invention concerned with the

Method and Apparatus for Testing the Productivity of Formations Encountered in Wells, not known or used by others before his alleged invention or discovery thereof or patented or described in any printed publication in the United States of America, or any foreign country before his alleged invention or discovery thereof for two years prior to his application for Letters Patent thereon in the United States of America, or more than two years prior to public use or sale of devices embodying his alleged invention or capable of being used in the alleged method thereof within the United States of America.

[fol. 16]

V

Answering paragraph V of said Bill of Complaint, defendants admit that Letters Patent of the United States of America No. 1,930,987 were issued on October 17, 1933, to Erle P. Halliburton, but deny the validity of said patent thereon under the provisions of said patent law, and deny each and every other allegation in said paragraph contained.

VI

Answering paragraph VI of said Bill of Complaint, defendants deny the existence of the rights alleged to be held by Erle P. Halliburton and/or Halliburton Oil Well Cementing Company under the provisions of Letters Patent No. 1,930,987, and being without knowledge as to the other allegations in said paragraph contained, leave plaintiffs to make such proof thereof as they may be advised.

VII

Answering paragraph VII of said Bill of Complaint, defendants deny that plaintiff Erle P. Halliburton ever introduced the alleged invention of the Simmons patent to the oil well industry, and deny that he ever proceeded to put the same into practical or other use for testing oil wells, particularly in the states of Oklahoma, Texas, Arkansas, Kansas, Louisiana, Wyoming, Montana, New Mexico and/or California, and defendants further deny that since February, 1926, or at all, plaintiff Erle P. Halliburton has invested and/or expended large or any sums of money and/or has been to great or any trouble in building up and/or conducting a business of testing oil wells, employing the process and/or apparatus alleged to be patented in and/or by said

[fol. 17] Letters Patent No. 1,930,987 in the states of Oklahoma, Texas, Kansas, Arkansas, Louisiana, Wyoming, Montana, New Mexico and/or California, and defendants deny that since the 9th day of October, 1933, or at all, Halliburton Oil Well Cementing Company, a corporation, one of the plaintiffs herein, has invested large sums of money or any sums of money or has been to great or any trouble in building up and/or conducting a business employing the process and/or apparatus alleged to be patented in said Letters Patent No. 1,930,987 in the states above enumerated, or elsewhere, and defendants deny that the apparatus and/or methods alleged to be patented in said Letters Patent No. 1,930,987 have come into extended and/or commercial and/or use and/or have become the standard apparatus and/or processes employed in the testing of formations encountered in the drilling of oil wells throughout the oil producing fields of the United States or elsewhere, and/or that said alleged inventions have been and/or are of great or any benefit or advantage at all to the oil industry of the entire world, or any part thereof.

VIII

Answering paragraphs VIII of the Bill of Complaint, defendant Honolulu Oil Corporation, Ltd., a corporation, denies that in an oil well in Kern County, in the Northern Division of the Southern District of California, or in any other point or place, that it has in any manner or form at any time or at any place infringed upon any alleged rights of plaintiffs alleged Letters Patent No. 1,930,987, as alleged in said Bill of Complaint, or otherwise, and M. O. Johnston Oil Field Service Corporation denies that it has in the Southern District of California, or at any other point or [fol. 18] place, or that it has in any manner or form, at any time or at any place, infringed upon any alleged rights of the plaintiffs under said alleged Letters Patent No. 1,930,987 by manufacturing apparatus and/or employing any processes claimed in said alleged Letters Patent, either severally or jointly, with the Honolulu Oil Corporation, Ltd., as alleged in said Bill of Complaint, or otherwise, and defendants further deny that they, or either of them, have made, used and/or sold and/or are now making, using and/or selling any device or devices for testing oil well formations in infringement of said alleged Letters Patent,

or any or all of the claims thereof without the consent of the plaintiffs herein or contrary to the written protests made by plaintiffs to defendants, or otherwise, and deny that defendants, or either of them, have infringed on any alleged rights alleged to be secured to plaintiffs under said alleged Letters Patent No. 1,930,987, and defendants deny that they are now continuing in said alleged infringement in the Northern Division of the Southern District of California, or at any other point or place, and deny that said plaintiffs have been seriously and/or irreparably damaged and/or injured, or at all, by the alleged acts of the defendants aforesaid, and/or that any serious or irreparable damage, or any damage, will result to said plaintiffs if said alleged infringement be permitted to continue.

IX

And for a further and separate defense defendants allege that by reason of the state of the prior art existing at the [fol. 19] time of said alleged invention by said John T. Simmons of the apparatus and method alleged to be patented in and by said alleged Letters Patent No. 1,930,987, the said device or devices and the said method was not an invention and did not require the exercise of inventive faculties for its production and was not patentable, and for that reason said alleged Letters Patent No. 1,930,987 are null and void and have no effect.

X

And for a further and separate defense defendants allege that the said John T. Simmons was not the original nor first nor sole nor any inventor nor discoverer of the alleged invention alleged to be patented in and by said Letters Patent No. 1,930,987, nor any nor all of the claims thereof, nor of any material or substantial part thereof, but prior to the alleged invention thereof by the said John T. Simmons and more than two years prior to the filing of the application for said letters patent, the said alleged invention and every material and substantial part thereof had been shwon, described and patented in and by each of the following Letters Patent of the United States of America, and had been invented by each of the patentees named in each of said letters patent and each of said patentees is the first and original inventor thereof, and at all times was

using reasonable diligence in adapting and perfecting the same, and the respective places of residence of said patentees are, as defendants are informed and believe, respectively set forth in said letters patent, to wit:

[fol. 20]

	Number	Name of Patentee	Date of Patent
	58,837	Q. Kewley	Oct. 16, 1866
	68,350	Burr & Wakelee	Sept. 3, 1867
	73,577	Carll	Jan. 21, 1868
	91,522	Collins	Jan. 22, 1869
	157,648	Stevenson	Dec. 8, 1874
	171,589	Stewart	Dec. 28, 1875
	193,915	Birge	Aug. 7, 1877
Re.	8,287	Stevenson	Jan. 18, 1878
	208,610	Koch	Oct. 1, 1878
	215,238	Philow, et al	May 13, 1879
	230,080	Stewart	July 13, 1880
	235,712	Stewart	Dec. 21, 1880
	235,972	Stewart	Dec. 28, 1880
	249,228	Dower	Nov. 8, 1881
	254,649	Haydrick	Mar. 7, 1882
	262,874	Williamson	Aug. 15, 1882
	263,330	Franklin	Aug. 29, 1882
	275,694	O'Hara	Apr. 10, 1883
	276,116	Williamson	Apr. 17, 1883
	310,066	McTighs, et al	Dec. 30, 1884
	480,926	Hoadley	Aug. 16, 1892
	524,666	Cavallaro	Aug. 14, 1894
	546,258	Suverkrop	Jan. 10, 1895
	582,828	McGregor	May 18, 1897
	595,306	Jackson	Dec. 14, 1897
	642,012	Shaw	Jan. 23, 1900
	785,933	Bloom	Mar. 28, 1905
	802,880	Phillips, Jr.	Oct. 24, 1905
	976,737	Hemme	Nov. 22, 1910

[fol. 21]

	Number	Name of Patentee	Date of Patent
	1,000,583	Cooper	Aug. 15, 1911
	1,021,600	Heeter	Mar. 26, 1912
	1,108,313	Anderson	Aug. 25, 1914
	1,456,693	Hicks, et al	May 29, 1923
	1,158,292	Rigby	Oct. 26, 1915
	1,164,655	McNallen	Dec. 21, 1915
	1,202,966	Carroll	Oct. 31, 1916
	1,247,092	Dodds	Nov. 20, 1917
	1,273,663	Pierce	July 23, 1918
	1,295,134	Dodds	Feb. 25, 1919
	1,300,346	Church	Apr. 15, 1919
	1,319,325	Dodds	Oct. 21, 1919
	1,335,880	Dodds	Apr. 6, 1920

Number	Name of Patentee	Date of Patent
1,336,537	Rembert	Apr. 13, 1920
1,347,534	Cox	July 27, 1920
1,360,053	Stumpf	Nov. 23, 1920
1,363,987	Lindsay	Dec. 28, 1920
1,411,486	Gallagher	Apr. 4, 1922
1,474,630	Halliday	Nov. 20, 1923
1,508,771	Boynton	Sept. 16, 1924
1,510,669	Halliday	Oct. 7, 1924
1,514,585	Edwards	Nov. 4, 1924
1,526,104	Tuley	Feb. 10, 1925
1,532,623	Fitzpatrick	Apr. 7, 1925
1,547,240	Steele	July 28, 1925
1,547,461	Steele	July 28, 1925
1,602,864	Steele	Oct. 12, 1926

[fol. 22] And in addition to the above listed prior patents, defendants believe that there are many others of which they are not advised at this time, and pray leave to set same up in an amended answer at a later date when the same shall become known to defendants.

XI

As a further, separate and special defense, defendants allege as special matter that the alleged invention attempted to be patented by said Letters Patent No. 1,930,987, was described in various printed publications prior to the supposed invention or discovery thereof by said John T. Simmons, and more than two years prior to his application for letters patent therefor, but the names of such publication or publications, and the name or names and addresses of the respective publishers are unknown to defendants at this time, and defendants pray leave to set up the same by amendment to this answer at a later date when the necessary information is obtained.

XII

As a further, separate and special defense, defendants allege as special matter that the alleged invention attempted to be patented in Letters Patent No. 1,930,987, and all of the subject matter thereof, were known to and in open notorious public use by others than the said John T. Simmons in the United States prior to any alleged invention or discovery by the said John T. Simmons, and for more than

two years prior to the filing date of the application for said letters patent, by the following named persons:

Charles R. Edwards of Houston, Texas;
Walter C. Parks of Iowa Park, Texas;

[fol. 23] and others whose names and addresses are unknown to defendants at this time, but defendants pray leave to set the same up by an amendment to this answer at a later date when the necessary information is obtained.

XIII

And as a further, separate and special defense, defendants allege as special matter that for the purpose if deceiving the public, the description and specification filed by said John T. Simmons in the United States Patent Office in his application which eventuated in Letters Patent No. 1,930,-987, was made to contain less than the whole truth relative to his invention or discovery, or more than is necessary to produce the desired result, and further, that the said alleged invention and the said alleged letters patent here in suit is lacking in novelty and/or utility, or the quality of invention, and that said letters patent, and each of the claims thereof, are invalid in all respects.

XIV

For a further, separate and special defense, defendants allege that plaintiffs are estopped by the proceedings in the United States Patent Office in the matter of the application for said alleged Letters Patent No. 1,930,987, and the acquiescence of the applicant for said letters patent in and to the rulings and rejections of the Commissioner of Patents in the negotiations for said letters patent and in and by the limitations imposed thereby during the negotiations in the Patent Office leading up to the alleged grant and issuance of said letters patent, and in so limiting and confining the claims of said application under the requirements of the Commissioner of Patents from asserting any such scope of invention or subject matter for said letters patent or the grant thereof as would comprehend or em-[fol. 24] brace or be applicable to any device, method, process and/or apparatus made or used or sold by the defendants, or either of them, or as to the making, using or

selling of which the defendants, and/or either of them, has contributed.

XV

For a further, separate and special defense, defendants allege that the patentee under said alleged letters patent surreptitiously and/or unjustly obtained the patent for that which was in fact the invention of others from whom he derived all of the subject matter disclosed in the alleged application upon which the said patent in suit is predicated.

XVI

For a further, separate and special defense, defendants allege that John T. Simmons surreptitiously and unjustly made application for letters patent, which application eventuated in said alleged Letters Patent No. 1,930,987, upon an alleged invention, which application was filed as that of a sole applicant when in fact it should have been filed, if at all, as that of joint applicants,

Wherefore, these defendants deny that the plaintiffs herein are entitled to the relief prayed for in the said Bill of Complaint, or to any relief, and pray to be hence dismissed with their costs and disbursements in this cause sustained, and for such other and further relief as to the court may seem just.

Hill, Morgan & Bledsoe, by Benjamin F. Bledsoe, W. M. Farrer, Solicitors and Counsel for Defendants.

[fol. 25] *Duly sworn to by M. O. Johnston. Jurat omitted in printing.*

[Endorsed]: Received copy of the within Answer this 14th day of December, 1933. Lyon & Lyon, attorneys for plaintiff.

[File endorsement omitted.]

[fol. 26] IN UNITED STATES DISTRICT COURT

ORDER GRANTING LEAVE TO AMEND ANSWER

The motion of defendants herein for leave to amend their answer came on for hearing on the 14th day of October,

1935, and the plaintiffs, through their counsel, consenting thereto,

It is Ordered, Adjudged and Decreed that defendants be permitted to amend their answer as prayed for in said motion, by filing the annexed amendments thereto.

Dated this 19th day of October, 1935.

Geo. Cosgrave, District Judge.

Approved as to form as provided in Rule 44. Leonard S. Lyon, Henry S. Richmond, Attorneys for Plaintiffs.

[fol. 27] In United States District Court

Amendment to Answer—Filed October 19, 1935

Come now the defendants, Honolulu Oil Corporation, Ltd., a corporation, and M. O. Johnston Oil Field Service Corporation, a corporation, and leave of court first had and obtained, amend their answer as follows:

I

By amending paragraph X to read as follows:

"X

And for a further and separate defense defendants allege that the said John T. Simmons was not the original nor first nor sole nor any inventor nor discoverer of the alleged invention alleged to be patented in and by said Letters Patent No. 1,930,987, nor any nor all of the claims thereof, nor of any material or substantial part thereof, but prior to the alleged invention thereof by the said John T. Simmons and more than two years prior to the filing of the application for said letters patent, the said alleged invention and every material and substantial part thereof had been shown, described and patented in and by each of the following Letters Patent of the United States of America, and had been invented by each of the patentees named in each of said letters patent and each of said patentees is the first and original inventor thereof, and at all times was using reasonable diligence in adapting and perfecting the same, and the respective places of residence of said paten-

tees are, as defendants are informed and believe, respectively set forth in said letters patent, to wit:

[fol. 28]

Number	Name of Patentee	Date of Patent
58,837	Q. Kewley	Oct. 16, 1866
68,350	Burr & Wakelee	Sept. 3, 1867
73,577	Carll	Jan. 21, 1868
91,522	Collins	Jan. 22, 1869
157,648	Stevenson	Dec. 8, 1874
171,589	Stewart	Dec. 28, 1875
193,915	Birge	Aug. 7, 1877
Re. 8,287	Stevenson	Jan. 18, 1878
208,610	Koch	Oct. 1, 1878
215,238	Philow, et al.	May 13, 1879
230,080	Stewart	July 13, 1880
235,712	Stewart	Dec. 21, 1880
235,972	Stewart	Dec. 28, 1880
249,228	Dower	Nov. 8, 1881
254,649	Haydrick	Mar. 7, 1882
262,874	Williamson	Aug. 15, 1882
263,330	Franklin	Aug. 29, 1882
275,694	O'Hara	Apr. 10, 1883
276,116	Williamson	Apr. 17, 1883
310,066	McTighs, et al.	Dec. 30, 1884
480,926	Hoadley	Aug. 16, 1892
524,666	Cavallaro	Aug. 14, 1894
546,258	Suverkrop	Jan. 10, 1895
582,828	McGregor	May 18, 1897
595,306	Jackson	Dec. 14, 1897
642,012	Shaw	Jan. 23, 1900
785,933	Bloom	Mar. 28, 1905
802,880	Phillips, Jr.	Oct. 24, 1905
976,737	Hemme	Nov. 22, 1910
1,000,583	Cooper	Aug. 15, 1911

[fol. 29]

1,021,600	Heeter	Mar. 26, 1912
1,108,313	Anderson	Aug. 25, 1914
1,456,693	Hicks, et al.	May 29, 1923
1,158,292	Ribby	Oct. 26, 1915
1,164,655	McNallen	Dec. 21, 1915
1,202,966	Carroll	Oct. 31, 1916
1,247,092	Dodds	Nov. 20, 1917
1,273,663	Pierce	July 23, 1918
1,295,134	Dodds	Feb. 25, 1919
1,300,346	Church	Apr. 15, 1919
1,319,325	Dodds	Oct. 21, 1919
1,335,880	Dodds	Apr. 6, 1920
1,336,537	Rembert	Apr. 13, 1920
1,347,534	Cox	July 27, 1920

Number	Name of Patentee	Date of Patent
1,360,053	Stumpf	Nov. 23, 1920
1,363,987	Lindsay	Dec. 28, 1920
1,411,486	Gallagher	Apr. 4, 1922
1,474,630	Halliday	Nov. 20, 1923
1,508,771	Boynton	Sept. 16, 1924
1,510,669	Halliday	Oct. 7, 1924
1,514,585	Edwards	Nov. 4, 1924
1,526,104	Tuley	Feb. 10, 1925
1,532,623	Fitzpatrick	Apr. 7, 1925
1,547,240	Steele	July 28, 1925
1,547,461	Steele	July 28, 1925
1,602,864	Steele	Oct. 12, 1926
182,098	Birge	Sept. 12, 1876"

[fol. 30] II

By amending paragraph XI to read as follows:

"XI

As a further, separate and special defense, defendants allege as a special matter that the alleged invention attempted to be patented by said Letters Patent No. 1930987 was described in various printed publications prior to the supposed invention or discovery thereof by said John T. Simmons and more than two years prior to his application for letters patent therefor, which said printed publications are as follows:

Fifth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1883-'84, by J. W. Powell, Director, printed in 1885 by the United States Government Printing Office and in particular pages 157-162 inclusive thereof.

Second Geological Survey of Pennsylvania: 1875 to 1879 Report III by John F. Carll published at Harrisburg, Pennsylvania in the year 1880 by the Board of Commissioners for the Second Geological Survey of the State of Pennsylvania, including the oil region maps and charts for said Report III, particular reference being made to pages 192-193 inclusive, 232 to 233 inclusive, 263 to 265 inclusive, 294, 311 to 324 inclusive.

Plate XXXIX appearing between pages 296 and 297 of said volume or report and plates XIV and XIV bis appearing in the Oil Region Maps and Charts for said volume or report.

Second Geological Survey of Pennsylvania, Report II by John F. Carll published in the year 1877 at Harrisburg,

Pennsylvania, by the Board of Commissioners for the [fol. 31] Second Geological Survey of the State of Pennsylvania and in particular pages 126 to 131 inclusive and pages 196 to 197 inclusive.

Production, Technology and uses of Petroleum and its Products by S. F. Peckham found in report of Census Office, Department of the Interior, Mis. Doc. 42, Part 10 of House of Representatives, Forty-Seventh Congress, Second Session, which was published in 1884 by the United States Government Printing Office, and in particular pages 6 and 7, 12, 87 to 91 inclusive, and plates and diagrams referred to therein."

III

By amending paragraph XII of their answer to read as follows:

"XII

As a further, separate and special defense, defendants are informed and believe and therefore allege as a special matter that the alleged invention attempted to be patented in Letters Patent No. 1930987 and all of the subject matter thereof, were known to and in open, notorious use by others than the said John T. Simmons in the United States prior to the said alleged invention or discovery by said John *P.* Simmons, and for more than two years prior to the filing date of the application for said Letters Patent by the following named persons:

Charles R. Edwards, of Houston, Texas. That said Charles R. Edwards used said device at Humble, Texas, in the winter of 1919-'20.

Walter C. Parks, of El Dorado, Arkansas. That said Walter C. Parks used the alleged invention in the year 1919 in a well located north of the K. M. A. oil field near the town of Iowa Park, Texas.

[fol. 32] E. H. Cox of Ada, Oklahoma. That said E. H. Cox used the alleged invention in the year 1921 on a well being drilled for the Home Drilling Company at or near the Town of Duncan, Oklahoma."

Dated October 3, 1935.

Miller & Boyken, Hill, Morgan & Bledsoe, by Kenneth K. Wright, Attorneys for Defendants.

[File endorsement omitted.]

Duly sworn to by M. O. Johnston. Jurat omitted in printing.

[fol. 33] IN UNITED STATES DISTRICT COURT

MEMORANDUM OF DECISION—Filed July 28, 1936

COSGRAVE, District Judge:

The patent in suit No. 1,930,987, granted to John T. Simmons, is for method and apparatus for testing the productivity of formations encountered in drilling oil wells and other deep wells. The method consists briefly in sealing off the formation or stratum to be tested from the strata above it by means of a packer, thus separating the two zones and relieving this stratum to be tested from the hydrostatic pressure of the rotary mud above it, and thus allowing the cognate fluids of the stratum to be tested to flow freely into the bore below point where the sealing off is effected and into the empty pipe carrying the packer which is controlled as to opening and closing by valves operated by movement of the pipe, entrapping the sample thus produced, and removing it from the well unmixed with rotary mud or other contents of the drill hole. The zone to be tested is that exposed in the "rat-hole", or a bore of reduced diameter which in oil well drilling regularly precedes the making of the full bore of the drill hole obtained when the rat-hole is reamed out.

The apparatus claims describe a packer surrounding the drill pipe, which, when pressed against the walls of the hole immediately above the stratum to be tested and when resting on the shoulder created by the diminished diameter of the rat-hole, effectually seals the rat-hole from the well above. A pipe conduit leading from the rat-hole through the packer into the empty drill pipe above is provided and is furnished with a valve which is opened by movement of the drill pipe and, after the contents of the rat hole, [fol. 34] or sufficient quantity of the same, has flowed into the empty drill pipe, the valve is closed by a reverse movement of the drill pipe, and the then entrapped sample is taken to the surface.

It seems to me that the Franklin patent No. 263,330 anticipates both this method and device. It is true that the Franklin patent exhibits a device for control and regulation of the flow of oil wells and does not include the taking of a sample, thus necessarily implying a flowing well. The Franklin device is to be connected with the tubing of the well, is provided with a valve which is opened and closed

by turning the tubing part way around from the surface. The tubing is kept closed while the device is being put into the well, opened after it is in the well, and closed while it is being drawn out. Plaintiff urges that keeping it closed while it is being drawn out cannot be accomplished due to the imperfect action of the valve described, but this even if true, is an unimportant feature. For the function claimed for the valve is a complete closure of the pipe while it is being withdrawn from the well. It is plain that although not the claimed object of the invention, a sample may be thus taken out of the well uncontaminated by the contents of the hole above. The use of a packer substantially as the same exists today is necessarily implied from the language of the patent. I am convinced of this both from the contemporarily literature on the subject descriptive of the state of the art and from the necessary implications of the patent itself. Without the use of a packer substantially as used today the device could not perform the function attributed to it. The inventor says: "When the tubing is put into the well or withdrawn from it it is desirable that no flow take place through it." If no packer is contemplated there [fol. 35] would be no object in "closing the tube for the purpose of allowing the gas to obtain a head." The Franklin patent may not be a tester, but very plainly it can be used as such; for by its use the contents of the producing stratum, sealed off from the remainder of the well unimpeded in its entry into the rat-hole by the pressure of the rotary mud, can be brought undiluted to the surface by a mechanism almost duplicating that shown in the patent in suit.

Judge Hutcheson, then of the Eastern District of Texas, said of the Franklin patent in Edwards v. Johnston Formation Testing Corp., 44 Fed. (2d) 607:

"This device, though designed for and used, not for the purpose of testing strata, but to regulate and control the flow of oil wels, had in it practically every suggestion of plaintiff's, and witnesses testified, and I think established, that it could have been taken as it was or with mere mechanical adaptation and actually used in a rotary well as a tester." (612.)

The testimony at the trial showed that a device made in accordance with the teachings of the Franklin patent had, but recently theretofore, been actually used for the

purpose of making a test of a water shut-off. The same device would produce a production test.

It was admitted at the trial that a packer to separate one stratum of the oil well from another is öld in the art. The Edwards patent, No. 1,514,585, antedating plaintiff's application, substantialy discloses the method and the device of plaintiff. The same is true of Cox, No. 1,347,534. The description of the Edwards device in the case referred to quoted by Judge Hutcheson from the argument of the plaintiff in that action might properly be used to describe that of the plaintiff in the case at bar.

[fol. 36] The object of these patents was precisely that of the patent in suit, that is to ascertain what the stratum that was being drilled was producing. The difficulties presented were the same. To make a test the inventors first proceed to separate the stratum to be tested from the bore above it. The separation is accomplished by the use of a packer. Communication between the stratum to be tested and the surface is obtained by means of an empty pipe with controlled valves. They then bring the product of the stratum to be tested to the surface for examination, entirely separated from the rotary mud or other contents of the bore above. Progressively the difficulties of the problem increased. The introduction of the rotary drilling system and use of drilling mud; the excessive depths of wells resulting in enormous pres-ure upon the machinery from the mud column, as well as from the formation; all these presented serious difficulties. It seems to me, however, that except as modified by the necessity of overcoming such difficulties the nature of the testing devices has been the same from the beginning.

The views here expressed are in substantial accord with the decision of the Fifth Circuit, on the appeal of Edwards v. Johnston Formation Testing Corporation, supra, and reported in 56 Fed. (2d) 49. That Circuit Court, speaking of the Edwards and Johnston patents, the latter being the device charged with the infringement here, says:

"From this outline of the prior art, and the Edwards and Johnston patents, we think it clear that neither patent is a basic or pioneer patent, but that each is for an improve-[fol. 37] ment only; each making at patentable advance over the prior art but a step rather than a leap."

Edwards v. Johnston Formation Testing Corp., 56 Fed. (2d) 49. (56.)

The same views sufficiently explain my reasons for not following the decision of Judge Bryant, of the Eastern District of Texas, who found the Simmons patent valid and infringed by the Johnston device.

It further fairly appears that the patent in suit was in itself an impractical device. No actual commercial use has been shown. The inventor h[illegible] within a month after the patent was taken over by the present owner was employed to devise improvements in the valve structure. This without doubt was due to the difficulty in operating the device at increased depths.

From the foregoing I am compelled to the belief that the Simmons patent, if valid at all, must be restricted to its precise form. The method claims, eight and eighteen, are rejected. Defendant's device, differing in operation in important respects, does not infringe.

Having expressed my views on the controlling issue with such brevity as the case permits there is no necessity for discussing the other questions presented.

Counsel for defendant will propose findings and decree in accordance herewith.

July 28, 1936.

[File endorsement omitted.]

[fol. 38] In United States District Court

Findings of Fact and Conclusions of Law—Filed October 23, 1936

This cause having come on regularly to be heard upon the pleadings and proof, the parties being represented by counsel, and the same having been tried, argued and submitted, upon consideration thereof, the Court now makes and files the following findings of fact:

Findings of Fact

1. That plaintiff Erle P. Halliburton is an inhabitant of the State of California and resides at Los Angeles therein, and plaintiff Halliburton Oil Well Cementing Company is a corporation organized and existing under the laws of the State of Delaware.

2. That defendant Honolulu Oil Corporation, Ltd., is a corporation organized and existing under the laws of the State of Delaware, and defendant M. O. Johnston Oil Field Service Corporation is a corporation organized and existing under the laws of the State of California, and each of said defendants maintains a regular and established place of business within the Southern District of California.

3. That on October 17, 1933, there was issued to plaintiff Erle P. Halliburton, assignee, on an application filed by John T. Simmons on February 10, 1926, Letters Patent of the United States No. 1,930,987 for method and apparatus for testing the productivity of formations encountered in [fol. 39] wells, and the said plaintiff has remained and now is the sole owner of said Letters Patent, and the plaintiff Halliburton Oil Well Cementing Company, by virtue of a certain license given and granted by said Erle P. Halliburton has been at all times since the issuance of said Letters Patent and now is the owner of the sole and exclusive license and liberty in and to any and all rights in and under the said Letters Patent, for the full term thereof and throughout the territory of the United States of America.

4. That subsequent to the grant of said Letters Patent, within the Southern District of California and elsewhere within the United States, the defendant M. O. Johnston Oil Field Service Corporation has manufactured and used apparatus in testing the productivity of formations encountered in oil wells, which manufacture and use are by plaintiffs alleged to infringe the said Letters Patent and the rights of the plaintiffs therein and thereunder.

5. That no apparatus manufactured by defendant M. O. Johnston Oil Field Service Corporation and no apparatus or method used by the defendants, or either of them, infringes the said Letters Patent No. 1,930,987, or any of the claims thereof, or any right of the plaintiffs or either of them therein or thereunder.

6. That Franklin Patent No. 263,330, dated August 29, 1882, anticipates both the method and apparatus disclosed and claimed in the patent here in suit.

7. That by using the device disclosed in said Franklin patent, a sample may be taken out of the well uncontaminated by the contents of the hole above.

[fol. 40] 8. That the use of a packer, substantially as the same exists today, is necessarily implied from the language of such Franklin patent. This is also apparent from the contemporary literature on the subject descriptive of the state of the art. Without the use of a packer substantially as used today the Franklin device could not perform the functions attributed to it.

9. That the device disclosed in said Franklin patent very plainly can be used as a tester; for by its use the contents of the producing stratum, sealed off from the remainder of the well, unimpeded in its entry into the rat hole by pressure of the rotary mud, can be brought undiluted to the surface by a mechanism almost duplicating that shown in the patent in suit.

10. That a device made in accordance with the teachings of said Franklin patent actually has recently been used for the purpose of successfully making a water shut-off test and the same device would also successfully make a production test.

11. That a packer to separate one stratum of the oil well from another is old in the art.

12. That Edwards Patent No. 1,514,585, dated November 4, 1924, substantially discloses the method and device disclosed and claimed in the patent in suit.

13. That Cox Patent No. 1,347,534, dated July 27, 1920, also substantially discloses the method and device disclosed and claimed in the patent in suit.

[fol. 41] 14. That the object of said Edwards and Cox patents was to ascertain what the stratum that was being drilled was producing, such object being precisely that of the patent in suit.

15. That the nature of the testing devices and methods of use disclosed in said Edwards and Cox patents, except as modified by the necessity of overcoming later difficulties, are the same as those disclosed and claimed in the patent in suit.

16. That there was no actual commercial use of the device disclosed and claimed in the Simmons patent in suit. Such device was impractical and the inventor himself, within a

month after the patent was taken over by the present owners, was employed to devise improvements in the valve structure of such device, due to the difficulty in operating it at increased depths.

17. That the Simmons patent in suit, if valid at all, must be restricted to its precise form.

18. That the two method claims in the patent in suit, namely claims 8 and 18, are invalid, for want of invention.

19. That the oil well testing devices manufactured or used by defendant M. O. Johnston Oil Field Service Corporation, differ in operation in important respects from the device disclosed and claimed in said Simmons patent, and such Johnston devices are not infringements of any of the Simmons patent claims here in suit.

From the foregoing findings of fact the Court now makes separately the follow-

[fol. 42] Conclusions of Law

1. That this is a suit in equity arising under the patent laws of the United States, and this Court has jurisdiction of the subject matter thereof and of the parties thereto.

2. That neither of the plaintiffs is entitled to the relief prayed in their bill of complaint or to any relief whatsoever against the defendants or either of them.

3. That the patent in suit, and particularly claims 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 thereof, is invalid.

4. That neither of the defendants has infringed said patent.

5. That the bill of complaint should be dismissed.

6. That the defendants should have and recover of and from the plaintiffs and each and both of them their costs herein to be taxed.

Dated Oct. 23, 1936.

Geo. Cosgrave, U. S. District Judge.

[File endorsement omitted.]

[fol. 43] In United States District Court for the Southern District of California, Northern Division

In Equity. No. D-56

Erle P. Halliburton and Halliburton Oil Well Cementing Company, a Corporation, Plaintiffs,

vs.

Honolulu Oil Corporation, Ltd., a Corporation, and M. O. Johnston Oil Field Service Corporation, a Corporation, Defendants

Final Decree—Filed October 23, 1936

This cause came on to be heard at this term, and was argued by counsel; and thereupon, upon consideration thereof, the Court having filed its memorandum of decision, it is:

Ordered, Adjudged and Decreed that Simmons patent No. 1,930,987, dated October 17, 1933, herein suit, and particularly claims 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 thereof, is invalid for want of invention, that defendants, and each of them, have not infringed said claims of said patent, or any of them; and that the bill of complaint be and the same is hereby dismissed, with costs to defendants taxed in the sum of $644.95.

Dated Oct. 23, 1936.

Geo. Cosgrave, U. S. District Judge.

Decree entered and recorded Oct. 23, 1936.

R. S. Zimmerman, Clerk, by Francis E. Cross, Deputy Clerk.

[File endorsement omitted.]

[fol. 44] In United States District Court

Notice of Lodgment of Narrative Statement of Evidence —Filed February 3, 1937

To Defendants, Honolulu Oil Corporation, Ltd., a Corporation, and M. O. Johnston Oil Field Service Corporation, a Corporation, and to Hill, Morgan & Bledsoe and W. A. Boyken, their Attorneys:

You, and Each of You, will please take notice that plaintiffs have this 3rd day of February, 1937, lodged with the

Clerk of this Court the Condensed Statement of Evidence to be included in the record on appeal to the Circuit Court of Appeals for the Ninth Circuit.

Notice is Further Given that plaintiffs will ask the Court to approve such Narrative Statement of Evidence on the 15th day of February, 1937, at the hour of ten o'clock A. M., or as soon thereafter as counsel can be heard, at the courtroom of said court.

Dated this 3rd day of February, 1937.

Lyon & Lyon, Leonard S. Lyon, Richard F. Lyon, Henry S. Richmond, Attorneys for Plaintiffs.

[Endorsed]: Due service and receipt of a copy of the within is hereby admitted this 3rd day of February, 1937. W. A. Boyken, Hill, Morgan & Bledsoe, atty. for defendants.

[File endorsement omitted.]

[fol. 45] IN UNITED STATES DISTRICT COURT

Narrative Statement of Evidence—Filed March 4, 1937

Be it remembered, that on the 11th day of November, 1935, the above entitled and numbered cause came on for trial before the Honorable George Cosgrave, United States District Judge for the Southern District of California, Northern Division, at Fresno, in said district, whereupon the following proceedings were had and taken, to wit:

APPEARANCES

Lyon & Lyon, Leonard S. Lyon, and Henry S. Richmond, all of Los Angeles, California, and Ben F. Saye, of Duncan, Oklahoma, Attorneys for Plaintiffs,

Hill, Morgan & Bledsoe, Vincent Morgan, W. M. Farrer, and Kenneth K. Wright, all of Los Angeles, and A. W. Boyken, of San Francisco, California, Attorneys for Defendants.

STATEMENT AS TO SUIT

Before the introduction of evidence was begun, plaintiffs' counsel stated, in response to the Court's question, that

plaintiffs would rely upon and seek recovery upon claims 8 to 19, inclusive, of the patent in suit.

Plaintiffs then offered a certified copy of Letters Patent to Simmons No. 1,930,987, granted October 17, 1933, and the same was received in evidence as Plaintiffs' Exhibit 1.

(Book of Exhibits, p. 1.)

[fol. 46] Plaintiffs offered certified copy of the file wrapper and contents of the patent in suit No. 1,930,987, and the same was received in evidence as Plaintiffs' Exhibit 2.

(Book of Exhibits, p. 10.)

Stipulation as to Certain Facts

Defendants then stipulated that, as alleged in plaintiffs' bill of complaint, plaintiff Erle P. Halliburton is the owner of said letters patent in suit, and that plaintiff Halliburton Oil Well Cementing Company is a corporation, and is the exclusive licensee under said patent, and that the plaintiffs were entitled to sue and recover for infringement of said letters patent.

Plaintiffs offered certified copy of the decision of the Board of Appeals of the U. S. Patent Office in Interference No. 59,515, and the same was received in evidence as Plaintiffs' Exhibit 3.

(Book of Exhibits, p. 145.)

Mr. L. S. Lyon: As Plaintiffs' Exhibits Nos. 4-A and 4-B, respectively, I offer in evidence certified records of the Patent Office in Interferences Nos. 55,940 and 55,941, respectively, which contain the record of the attempt by Johnston to contest this Simmons patent, the contest on the patentability, showing that Johnston could not win on priority, and the decision of the law examiner holding that the invention was patentable and overruling Johnston's motion attacking the patentability.

"Mr. Boyken: That is not the Johnston who is a defendant in this case, your Honor.

[fol. 47] Mr. L. S. Lyon: The defendant's affidavit here states that this defendant is a licensee of that defendant."

The Court: Very well.

(Book of Exhibits, p. 183 and p. 204.)

Mr. L. S. Lyon: At this time I would like to offer in evidence, or lodge as an exhibit in this case, within your Honor's ruling or indication a few moments ago, a certified copy of the record made at the trial in the Texas case, which is entitled "Erle P. Halliburton and Halliburton Oil Well Cementing Company, a corporation, Plaintiff, vs. Johnston Formation Testing Corporation, a corporation, and E. C. Johnston, In Equity No. 693, In the District Court for the Eastern District of Texas, Tyler Division." I am not offering this as testimony in this case in the sense that we take the testimony of witnesses here. This is merely made a part of the record in this case so that your Honor can compare what was before the court there with what is before you here in determining how far you will be guided, if at all, by what was decided in Texas.

Mr. Boyken: We interpose the same objection, your Honor, that we are in no way bound by this decision that was rendered by the Texas court. And we believe that the record in the Texas court has no place in this court here because we expect to introduce additional defenses that were not in that Texas case. As your Honor indicated before, if you care to examine this record perhaps at the conclusion of this trial, why, of course, that would be up to your Honor to decide but I don't think it is a proper exhibit in this case especially at the present time. And I object to it on that ground.

[fol. 48] The Court: The objection to that will be sustained. My present impression is that is not the ordinary procedure. I will advise myself with respect to it and you may renew it some time later but for the present I will decline to receive it.

Mr. L. S. Lyon: And may I have an exception?

The Court: Yes.

Mr. L. S. Lyon: I might state, your Honor, in numerous patent cases in our own District similar questions have arisen, where records have been presented in other cases, and the same argument has eventually resulted in the record being received. In the Neon Light cases that were tried here eastern decisions and records were received. I am not offering them in any way that will conflict with anything that Mr. Boyken is objecting to.

The Court: Your position, it seems to me, would be about like this, that after the evidence in this case is in that record might show the same thing was testified to in the

other case and that here is what the judge said about it. That is about the situation. Whether that is admissible for the purpose that you state I confess I am not advised. I don't care to receive it until I have given the matter some little investigation.

Mr. L. S. Lyon: We will ask that it be marked Exhibit 5 for Identification, your Honor.

The Court: Yes.

The Clerk: Plaintiffs' Exhibit No. 5 for Identification.

(Not printed, but is sent up as a physical exhibit.)

[fol. 49] The Court: You have your exception to the rejection of the offer.

Mr. L. S. Lyon: Yes, your Honor. I will also offer in evidence, as Plaintiffs' Exhibit No. 6, a certified copy of an interlocutory decree in the Texas case, which certified copy is annexed to the plaintiffs' application for a temporary injunction in this case.

And, as Plaintiffs' Exhibit No. 7, I will offer a certified copy of the findings of fact in that case, which certified copy is also annexed to the plaintiffs' motion for an injunction in this case.

I assume that those will both be subject to the same ruling and exception.

The Court: Yes. Let them be marked for identification.

The Clerk: Plaintiffs' Exhibit No. 6 is the interlocutory decree and Plaintiffs' Exhibit No. 7 is the findings, both for Identification.

(Book of Exhibits, p. 215.)

Mr. L. S. Lyon: Without prejudice to Mr. Boyken's objection or our exception and merely to save time, I will ask if he is willing to stipulate that the device found to infringe in the Texas case and the method found of using that device, there found to be an infringement, is the same device and the same method employed by the defendants here, and that the defendants' answers to interrogatories [fol. 50] in that case and in this case are identical, accompanied by the same illustrations.

Mr. Boyken: I am unable to stipulate to that, your Honor, as much as I would like to. I wasn't in the Texas case.

The Court: Very well. That is settled. You are not able to stipulate to it.

Mr. L. S. Lyon: Then, as Plaintiffs' Exhibit No. 8, I will offer in evidence a certified copy of the interrogatories propounded in the Texas case to the defendants and the answers thereto, together with the exhibits accompanying those answers, which I assume will be subject to the same ruling and exception, your Honor.

The Court: Yes. They will take the same course.

The Clerk: Your Honor, is that in evidence or for identification?

The Court: You didn't object to it. I am simply assuming you will object.

Mr. Boyken: Mr. Lyon, I understood, said that he understood this would be subject to the same ruling.

Mr. L. S. Lyon: Yes.

The Court: Very well. It will take the same course as the preceding offer.

The Clerk: Plaintiffs' Exhibit No. 8 for identification.

Mr. L. S. Lyon: All of Exhibits 5, 6, 7 and 8, as I understand it, are for identification at this time, as ruled by the court.

[fol. 51] (Testimony of Erle P. Halliburton)

Erle P. Halliburton, one of the plaintiffs, called as a witness on behalf of the plaintiffs, testified as follows:

My name is Erle P. Halliburton. I reside at 19 Berkeley Square, Los Angeles, California. I am 43 years of age. I am one of the plaintiffs in this case and am president and general manager of the Halliburton Oil Well Cementing Company, the other plaintiff herein. The character of the business engaged in by the Halliburton Oil Well Cementing Company is rendering an oil field service, cementing oil wells, testing oil wells, manufacturing and selling oil field supplies, and acidizing oil wells. The principal place of business of that company is located at Duncan, Oklahoma. Halliburton Oil Well Cementing Company operates throughout the states of West Virginia, Pennsylvania, New York, Michigan, Kansas, Oklahoma, Arkansas, Louisiana, Texas, New Mexico, Colorado, Wyoming, Montana, California, and Canada. The company has places of business and facilities to service wells drilled in each of those different states.

I entered the oil well cementing business in 1917. Prior to that time I had been engaged in various mechanical

capacities and had served an apprenticeship in marine steam engineering in the U. S. Navy. My first experience in the oil fields, I think, was in December, 1916, and ever since that time I have been in oil field work. I started out at Taft, Kern County, California, working for the Perkins Oil Well Cementing Company, and was with that company about two years. I then went to Burkburnett, Texas and from there to Oklahoma, where I started in the well cementing business for myself. I continued to [fol. 52] operate the oil well cementing business as an individual until the plaintiff, Halliburton Oil Well Cementing Company was organized under the laws of the State of Delaware on July 1, 1924. Ever since July, 1924, plaintiff Halliburton Oil Well Cementing Company has been continuously engaged in the oil well cementing business. I have been president of the plaintiff Halliburton Oil Well Cementing Company continuously since its organization.

"Mr. Boyken: If your Honor please, I want to object to that. I understand that Mr. Halliburton is being qualified now as an expert witness. He is the plaintiff in the case and I object to him testifying as an expert witness when he is the plaintiff in the case. I don't, of course, object to Mr. Halliburton giving any fact testitimony but I do think that he should not be qualified nor be permitted to testify in this court as an expert and give matters of opinion."

The Court: The objection is overruled, on the grounds stated. I know of no decision against it and no rule. There is no legal obstacle that I know of to the receipt of the testimony of an interested party on expert questions.

Mr. Boyken: An exception.

Aside from the particular patent here in suit, concerning the court experience that I have had with regard to patents and their interpretation and construction, I wish to state that I have been continuously involved in patent litigation, since around 1920; some 15 years. I have, myself, filed, or had filed, numerous patent applications in the United States Patent Office on inventions which I, myself, have invented. I am familiar with the methods of applying prior art to in-[fol. 53] ventions. I am familiar with the reading of patents and patent drawings and I understand drawings and speci-

fications and claims of patents. I have had granted to me several patents, some quite valuable, in connection with the cementing and drilling of oil wells and a method of automatically feeding a bit to its work in drilling and several methods of cementing oil wells. I have testified in other patent cases. I have testified before the late Judge Trippet, Judge Bledsoe, the late Judge Cotteral of the Western District of Oklahoma, Judge Bryant of the Eastern District of Texas, and Judge McCormick of this court. In addition to being able to make the paper comparisons to which I have referred, I wish to state that I have had actual experience with testing devices in the oil fields in testing wells, and I am thoroughly familiar with the mechanics of the testing devices here involved in this case.

The Halliburton Company has two types of testing devices and all of the accessories that go along with them to make it possible to test wells where the hole is drilled of different sizes, and we have men who are experienced in the operation of the testing device, who deliver the testing device to the well and who assist in making a test where their services are required. And then, after the test, they return the testing device to the field service station and there the device is taken apart and repaired, if any repairs are needed, and cleaned up for the next job. The men employed usually had years of experience in the drilling of oil wells and were familiar with the operation of the device. Halliburton Oil Well Cementing Company has special men for testing in Texas, Louisiana, Arkansas, Oklahoma, New Mexico and California, consisting of about 30 or 35 field [fol. 54] service men. In addition to that, there are other men who look out for the equipment and serve in other capacities. Then we have in districts where the drilling is not so active oil well cementers who are also qualified as testers and test the wells.

Plaintiffs' Exhibits 5 and 19 in the Texas case, which you show me, are two forms of testers that are used by the plaintiff Halliburton Oil Well Cementing Company in testing oil wells.

In February, 1926, I was in Oklahoma. My brother, who was superintendent for the Halliburton Oil Well Cementing Company in Eldorado, Arkansas, advised me that there was an invention in Eldorado, that I should come on to see. I went to Eldorado, Arkansas, and

arrived there on the 13th day of February, late in the afternoon. My brother met me and we went into the lobby of the hotel, and John T. Simmons had on display in the lobby of the hotel a testing device. The gentleman here in the court room who has just stood up is the John T. Simmons to whom I refer. I had first met Mr. Simmons in Tonkawa, Oklahoma, in 1923. I knew him as a driller through the oil fields and a person who had invented a tool for pulling casing; I knew him more as an expert driller than anything else. Mr. Simmons had on display in the lobby of the hotel a testing device, a single string testing device carrying a packer and a valve, with the valve so constructed that it could be opened and closed by movement of the pipe. The particular device which I saw being demonstrated by Mr. Simmons in the hotel in February, 1926, is here now in the court room. It is the same device that I identified before Judge Bryant in the Texas case.

[fol. 55] Mr. L. S. Lyon: We will offer this device, which has just been identified by the witness, as Plaintiffs' Exhibit No. 9.

The Court: It will be admitted.

By Mr. L. S. Lyon:

Q. Will you step down to Exhibit 9 and demonstrate with it and explain with it to the Court what the device is and how it was to operate, as explained by Mr. Simmons to you in February, 1926, at that first meeting in the hotel?

A. The device carries a packer below an adjacent body part. The body part has two holes drilled through it communicating with the inside of the mandrel on which the packer is fitted. The body part has a pin that is threaded and that receives two adjusting nuts. Then there is an upper body part that has two holes drilled through it in such a manner that when the upper body part is turned in one direction the holes in the upper body part are aligned with the holes in the lower body part that communicates with the mandrel, the inside of the mandrel on which the packer is fitted. The upper body part is threaded to receive a drill pipe and the holes through the upper body part communicate with the inside of the pipe. The two body parts are ground in such a manner that they fit together so that fluid will not leak when the adjusting nuts have been

properly drawn up and the proper lubricant has been used between the working part of the upper and the lower body parts.

Q. I hand you a small metal model. Is that a correct representation of Exhibit No. 9 drawn to scale?

A. Yes.

[fol. 56] Q. Can you take this model apart and show the Court the interior construction of Exhibit 9 that you have been describing?

A. Yes.

(Plaintiffs offered the small model of Exhibit No. 9, and the same was admitted in evidence as Plaintiffs' Exhibit 10.)

The Witness: My understanding is that Exhibit 9 and the patent drawing were made from the same drawing, made by the Eby Engineering Company, and that Exhibit 10 was made from the patent drawing, one of those drawings; at any rate it is substantially the same thing, only just reduced in size.

By Mr. L. S. Lyon:

Q. Mr. Halliburton, will you please step down to Exhibit No. 9 and take the exhibit apart and explain to the Court how it is constructed and how it operates?

A. I will, first, remove the locking nuts in order that the top body piece can be removed from the pin of the lower body piece, in other words, the pin that holds the device together. With the top body piece removed it will be noted that there is a slot cut in the radius of the top body piece, so arranged that a pin in the lower body piece can engage this slot and limit the rotation of the top body piece relative to the lower body piece. In other words, this pin and slot limit the movement of the top body piece so that when the top body piece is turned as far as it can be turned in one direction the holes on this won't align, closing the valve, and when the top body piece is turned as far as it can be turned in the opposite direction [fol. 57] the holes in the top body piece and the lower body piece are aligned, opening the valve so that any fluid entering the intake or collar below the packer can pass up through the valve and into the pipe which is attached to the top body piece by means of drill pipe threads.

Q. How does this device, Exhibit No. 9, compare with the device shown in the drawings of the patent in suit?

A. It is almost identical with the exception that we do not have the perforated pipe that screws onto the collar below the packer.

Q. That is No. 12 in the drawing?

A. No. 12. And No. 13 is not present with the device which is shown in the drawing but that perforated pipe varies in length, depending on the depth of the "rat-hole," and also in the size of the perforations, depending on the condition of the formation being tested.

Q. When you first observed this device being demonstrated by Mr. Simmons in the hotel in February, 1926, was it accompanied by such a piece of perforated pipe and plug?

A. Yes.

Q. Do you know what has become of the original plug and piece of pipe?

A. No.

Q. When this device is assembled and operated in a well how do you lower it into the well? By what means?

A. You lower it into the well by means of the drill pipe. In other words, it is attached to the drill pipe the same as you would attach a bit or a drill collar to the pipe.

Q. That is, to the end of the pipe?

A. It is to the lower end of the pipe.

[fol. 58] Q. What constitutes the lower end of this device?

A. The lower end of the device would be the intake, perforated nipple and mandrel. That is the portion below the valve and the packer.

Q. Just point to which is the lower end of this.

A. This is the lower end and that has the collar on it, a pipe collar.

Q. How do you attach the device to the pipe, by what part?

A. By the top body part, which is screwed onto the pipe.

Q. What part of this device constitutes the packer?

A. The packer is this cone-shaped rubber member that is just below the lower body part of the device.

Q. Is that any particular type of packer?

A. Well, that is a solid rubber packer. In experience we have found that fabricated cotton and rubber make a more substantial packer than the solid rubber.

Q. Is the word "packer" in the oil field art limited in meaning to a cone-shaped device like that on Exhibit 9?

A. No. There are many, many kinds of packers used in the oil industry.

Q. And this is one particular kind?

A. This is one particular kind.

Q. How is the packer positively pressed against the walls of the formation when the device is operating?

A. In drilling a well it is customary to drill a small hole ahead of the regular sized hole in which the casing is to be set, for the purpose of exploring with this pilot hole, called a "rat-hole," the formations below there, coring and catching the cuttings. Then when this testing device is set into the well this cone-shaped packer sets on the shoulder that is created by the difference in the size of the "rat- [fol. 59] hole" and the regular sized hole that is drilled to receive the casing.

Q. In other words, you lower the pipe down until this packer strikes that shoulder?

A. And engages the formation there.

Q. What is accomplished by doing that?

A. That seals off the drilling fluid in the annular space between the casing and the wall of the earth bore hole.

Q. What is the purpose of doing that?

A. To take the pressure off of the formation. You see, in drilling an oil well with the rotary method of drilling the weight of the mud fluid, the specific gravity of it, must be such as to create a hydrostatic pressure that will exceed the expelling force or expelling pressure of any fluid contained in porous formations encountered in drilling. In other words, if the pressure within the bore hole, that is, the hydrostatic pressure, was less than what we call the rock pressure or the native pressure of the cognate fluid, then the cognate fluid would force the mud fluid or drilling fluid from the well and cause the well to blow out. So by sealing off the mud fluid from above the formation by means of the packer, and if the valve in the testing apparatus has been closed as the testing apparatus is lowered into the well, then when the valve is opened the pressure of the cognate fluid in the formation is opened up to atmospheric pressure through the pipe, which is empty, and therefore it flows into the pipe, up through the valve.

Q. If you are going to take a test of a formation without bailing or removing the mud fluid from the well is it neces-

sary to seal off or pack off the tester so as to relieve the [fol. 60] formation of the weight of the pressure of the mud fluid?

A. It is necessary to maintain mud fluid in any open hole. To remove the mud fluid would cause all of the different formations drilled through to slough off, and those formations that would make water, oil or gas would come into the well and would destroy it, unless you maintained a mud fluid in the annular space back of the pipe. Unless you had some pipe in there you couldn't remove the mud fluid from the well.

Q. You have given the reason for having the mud fluid in the well. If you are going to make a test without taking that mud fluid out of the well is it necessary to separate or pack off the well in order that the weight of that fluid will not be operative on the formation that you are testing?

A. Yes. It is necessary, to get a productivity test, to seal off the hydrostatic pressure of the mud fluid from the formation. You see, a lot of times testing is confused with samples taken, such as a sample of the formation, in other words, that you take for geological reasons. This device is for the purpose of making a productivity test of the cognate fluid itself and not of the formation in which the cognate fluid is contained.

Q. You have used that term "cognate fluid." What do you mean by that?

A. That is any fluid that is placed in a formation by nature, such as oil, water or gas.

Q. What parts of this device constitute the valve?

A. The parts of the device that constitute the valve are the upper and lower body parts, with the holes drilled through them so that they are aligned and misaligned when [fol. 61] the upper body parts are turned by movement of the pipe.

Q. Can you tell us whether or not that particular type of valve in Exhibit 9 is an unusual type or is a common type in mechanics?

A. Well, of course, almost all positively controlled valves consist of opening and closing ports, but, of course, for an exact valve, this is constructed purposely and in accordance with well designed principles of valve structure as a valve for a testing device.

Q. When you saw this device for the first time——

The Court: You had better not put that back together. I want to ask you some questions about that.

Mr. L. S. Lyon: Well, perhaps this would be a good time to do it.

The Court: Show me the valve.

A. Here is the hole in the lower body part, drilled at an angle, and here is a hole in the upper body part that comes through here.

The Court: The holes in the lower body part are continuations of the holes in the upper body part?

A. When the upper body part is turned in one direction they are, and when the upper body part is turned in the other direction, they are misaligned, and therefore no fluid can pass through the holes.

The Court: Show me the top opening of the holes.

A. The top opening of the holes is these two holes here out near the threads.

The Court: Does the fluid that you test go through those holes?

A. Yes, sir. It comes out through those holes.

[fol. 62] The Court: Where is the lower end of the hole?

A. The holes terminate into the mandrel on which this packer——

The Court: Well, you haven't come to that yet.

Mr. L. S. Lyon: Maybe you had better take it apart right now, if you can, and show the court.

A. The hole in the lower body part terminates inside of this mandrel on which the packer is located, so that any fluid entering here can come up against and go out through this hole here.

By the Court:

Q. Those holes slant, do they?

A. Yes, sir. They are drilled in at a slant. I have a drawing——

By Mr. L. S. Lyon:

Q. Can you refer to the patent drawing?

The Court: You don't need to do that. I see that the holes from the upper and lower body parts go at an angle and go into or form an opening into that pipe.

Mr. L. S. Lyon: That is correct.

A. You can look through the hole here.

By the Court:

Q. They open into the pipe?
A. Yes, sir.

By Mr. L. S. Lyon:

Q. Then, any fluid going into the pipe from below the packer goes on up through those holes into the pipe?
A. Yes, sir.

The Court: I can't see it but I know it is there.

By Mr. L. S. Lyon:

Q. I will ask you to explain how this valve is operated from the top of the well.
A. It is operated by a rotation and movement of the pipe.

[fol. 63] Q. When the device is being lowered into the well how does the valve set?
A. The valve is closed while the testing apparatus is being lowered into the well.

Q. Then, after you have set the packer how do you open the valve?
A. You rotate the pipe and align the holes through the top body member and the lower body member.

Q. Do you do that from the top of the well?
A. From the top of the well by movement of the pipe.

Q. Ordinarily how long do you leave the device set there with the packer seated and the valve open to take a test?
A. It all depends on how it shows up; in other words, the amount of blow that you get through the top of the well. You see, even with a small amount of fluid coming in at the bottom, that forces the air out through the top, and by putting a wet handkerchief or anything over the top of the pipe the fluid coming in forces the air up and out, and it will be noticed that sometimes on gas wells we only leave them open for a minute and sometimes 15, 20 or 30 minutes and sometimes longer.

Q. Can you give us an idea of how long it is not uncommon to have to leave these devices stand set with the valve open in the bottom of the well to make a test?
A. Oh, 15 or 20 minutes.

Q. How do you close the valve at the end of that period?
A. By turning the pipe in the opposite direction from

which it was turned to open the valve, misaligning the ports or holes through the body part.

[fol. 64] Q. Then, after you have closed the valve what do you do in taking a test?

A. Then you withdraw the device from the well the same as you would withdraw a bit from the well, that is, the packer and the whole testing device, bringing it out with the valve closed against the entrance of fluid from the well.

Q. What does that enable you to recover?

A. That enables you to recover a sample of any fluid that may have entered the pipe during the time the valve was open and the test was being taken.

Q. By examining that fluid you determine what?

A. By the height that the fluid comes into the drill pipe you determine largely the amount that the formation tested will produce.

By the Court:

Q. Let me interrupt there. This "rat-hole", however, at first is filled with the fluid?

A. It is full of mud fluid, your Honor; yes, sir. The well is full from the very bottom to the top.

Q. Whatever you get in the way of your test, exuded from the sides, from the hole, mixes with that?

A. What little fluid would be in the "rat-hole" would come up into the drill pipe, that is, I say——

By Mr. L. S. Lyon:

Q. Through the tester?

A. It would come up through the tester and with the drill pipe. Some of it might not. It would depend on the strength of the well. If it was a strong gas well, it would blow all of that mud and everything out to the top of the well, and you might have a little oil and you might have nothing because the gas had removed everything from it when it came out. But it would be very necessary to close the device even though it was a gas well because the [fol. 65] rush of the mud fluid down the outside and back up into the drill pipe would relieve the hydrostatic pressure on the gas sand and the well might blow out.

Q. You are explaining to the court now, so as to make it clear, why it would not be safe to make a test unless you could close the valve?

A. That is it.

By the Court:

Q. What I wanted to know about, although I don't know whether it has any bearing on the situation or not, is this: The contents of the "rat-hole", that is, the amount of mud in the "rat-hole", must go into the same chamber where your testing fluid does?

A. Yes, your Honor.

Q. It will necessarily be mixed with what you test, will it not?

A. Not to any large extent. In other words, suppose you got two or three hundred feet of oil and you would have one joint of mud. That oil and mud might be emulsified and then again your mud might be in the bottom of the tester and the oil on top of it. It would depend on how it came in. Sometimes you will have a column of water even shoved up into the pipe, with the oil under it. It depends largely on which fluid entered the pipe first.

Q. At any rate, the quantity or proportion would not be serious enough to prevent you from accomplishing the purpose of the examination, knowing what you were getting?

A. No, your Honor. You see, if it was a very weak well, the oil would come in without forcing the mud out of the "rat-hole," while, on the other hand, if it was a rather strong oil well, it would bring the mud fluid out, too. But [fol. 66] the amount of mud fluid as compared to the amount of oil would be small and you would expect that small amount of mud. In other words, when we make a dry test we always bring out a little mud fluid in testing a formation that doesn't contain anything because the mud fluid trapped below the packer under a tremendous pressure comes into the pipe when the valve is open maybe a half a joint or a quarter of a joint. You see, it is not uncommon to get two or three thousand feet of oil in one of these tests.

By Mr. L. S. Lyon:

Q. In the operation of this device as it was described to you by Mr. Simmons does this involve the use of only a single string of pipe to make a test?

A. Yes. In other words, Mr. Simmons had the device and explained to me its operation, explaining the apparatus itself and the method of the apparatus and operating it.

Q. Prior to that explanation and demonstration had you ever seen a device like this or the operation of a method such as you have described?

A. I had never known of a method of making a productivity test of a formation such as that until Mr. Simmons described this method and apparatus to me. I had never known of a previous method like it.

Q. You had had vast experience in connection with the drilling of wells and the way they were drilled and tested at that time?

A. Yes; throughout the oil producing country of the United States.

[fol. 67] Q. How had they tested wells up to that time to your knowledge?

A. In drilling, when they would find what they thought to be a favorable formation, they would set casing on that formation, usually cementing the casing in the well, and then go in and drill the cement out and either swab or bail the mud fluid from the well in order to determine just how much commercial production the formation would produce.

Q. If they found that that wasn't a productive point to complete the well, then what did they have to do?

A. Then they had to reduce the size of the hole slightly less than the inside diameter of the casing which they had set in the well and drill ahead, looking for another sand. If they found a favorable sand, then they would repeat the performance of setting an additional string of casing and either swab or bail to bring the well in.

Q. What is saved by the use of this method and device, Exhibit No. 9, over the old method of setting the casing and bailing or swabbing it to make a test?

A. If you test a formation that doesn't prove productive, you have saved a string of casing, the expense and time of setting it and the expense and time of bailing to test it. In each formation that you test and would set casing on that doesn't produce, a large number of sands from cores that would indicate production are not commercial producers. In addition to that, the device can be used in separating the water sands from oil sands by drilling ahead and making a few feet of hole and testing. And, if you have water just above the oil sand, you can find out just exactly where the water sand is by the device and set your casing just below the water. And it has many advantages over [fol. 68] the methods that were used prior to its introduction into the oil industry.

Q. You first observed Mr. Simmons demonstrating the device in the hotel in Eldorado and listened to his explanation. And then what did you do about it?

A. I entered into a contract and agreement with Mr. Simmons and his partner, Mr. Henderson, in which I was to have the control of prosecuting the application through the Patent Office and was to go in that business. And after that time I bought out their interests.

Q. How soon did you make that first agreement?

A. I started negotiations on the night of the 13th of February, 1926, and drew the contract of agreement and signed it on the 17th of February, 1926.

Q. Did that first agreement involve any payment by you to Mr. Simmons and his partner in cash?

A. I do not remember if it did or not but I afterwards bought their interest and took an assignment to the patent.

Q. How much did you pay for it? Do you remember?

A. Altogether I believe about fourteen or fifteen thousand dollars; I know $10,000 at one time.

Q. After completing this agreement, this preliminary agreement, with Mr. Simmons what did you do about this invention?

A. I had Mr. Simmons bring the device up into the hotel from the lobby, that is, up into my room. And he left it there until we completed the agreement and then I had Mr. Simmons take the device to Duncan, Oklahoma. I wired Mr. A. B. Stoddard, who was in Bartlesville, Oklahoma, an engineer employed by me, to come to Duncan and he arrived there either on or just prior to February 22, 1926, [fol. 69] for the purpose of making certain tests of the apparatus in the oil fields of Oklahoma.

Q. Will you proceed and tell us what was done with this invention by you and under your direction following your return to Oklahoma with Mr. Simmons and Exhibit 9?

A. We endeavored to get someone to let us run the device in a well and after about 30 days we secured permission from George Pace, an independent operator at Duncan, Oklahoma, in Stephens County, to let us demonstrate the device in a well that he was drilling out west of Duncan.

Q. What was the cause of the difficulty in getting permission to run this device in somebody's well?

A. It was revolutionary and no one thought that you could leave the device in a well without circulating and not have it stick.

Q. Will you explain now to the court just what you mean by that last statement, what you mean by not circulating and so forth?

A. It has been common practice to circulate and move the drill pipe continuously in order that you can keep the formation from caving and bridging around the collars of the pipe and sticking so that you can't remove it.

Q. How do they circulate ordinarily in drilling by the rotary method?

A. By pumping fluid down through the drill pipe and out at the bottom, return it in the annular space between the drill pipe and the earth bore hole, causing a continuous circulation, which removes any cuttings or cavings that might become dislodged from the wall of the well.

[fol. 70] Q. In the operation of this Exhibit 9 is it possible to circulate the mud?

A. No. Mr. Simmons explained to me that it would not stick. And my experience in cementing casing was, if the mud was left quiescent, that the pipe could be left quiescent a sufficient length of time to make a test without any serious hazard of sticking the pipe. But that was not accepted throughout the industry. As a result I had to assume any liability to the well, the first few wells, that we tested for George Pace.

Q. Did you charge for these first few wells, for the testing operations?

A. No.

Q. You did that free?

A. Yes.

Q. And, in addition to that, you had to make what guaranty?

A. I had to agree to assume any liability to the well. In other words, if the device should become stuck or anything, I would have to drill him a new well or whatever was necessary to satisfy him.

Q. When were those first tests made?

A. They were made in March, 1926.

Q. Where?

A. The first test was made on March 17th, of which I have a written report that was dictated in my presence by Mr. Stoddard.

Q. He was the engineer of the Halliburton Company?

A. No. He was working—well, yes, for the Erle P. Halliburton Company.

Q. What device was used in the first test?

A. This very device here on the floor.

[fol. 71] Q. Exhibit 9 itself?

A. Yes.

Q. And who ran the test?

A. Mr. Stoddard and Mr. Simmons made the test, and I witnessed the test, offsetting a Houston well that the first test was made on, out west of Duncan, and I think that well too is on the Houston lease.

Q. Were those the first tests that had ever been made with Exhibit 9?

A. Yes.

Q. The first tests that had ever been made with the invention of this patent?

A. Yes.

Q. How successful were they?

A. The test that I saw was very successful, and the report would indicate that the test made with it was successful.

Q. Of your own recollection can you state whether or not the test was successful?

A. Yes, the test was successful.

Q. What is meant by a test being successful? What is a successful test, as distinguished from an unsuccessful test?

A. A successful test is to be able to screw the testing apparatus onto the drill pipe with the valve closed, the packer installed, and running the testing apparatus into the well on the drill pipe with the valve closed, and seating the packer above the formation to be tested, so that the fluid from above the packer cannot enter the test string of pipe, and then opening the valve to permit the fluid from the formation being tested below the packer to enter the test string of pipe, [fol. 72] and, after the valve has been opened a sufficient length of time to permit any fluid below the packer to enter the test string, then closing the valve and withdrawing the testing apparatus, including the packer, from the well with an entrapped sample of any fluid that may have entered the test string when the valve was open.

Q. Would the test be successful if you were able to carry out those steps and determine when the tester is removed from the well that nothing had entered the test pipe?

A. Yes.

Q. What would that indicate?

A. That would indicate that there was no fluid contained in the formation being tested.

Q. Then a successful test is one that tells you whether or not the formation contains water, oil or gas; is that correct?

A. In commercial quantities, yes.

Q. Having demonstrated on these wells of Mr. Pace that this apparatus of Exhibit 9 and the method you have described could be successfully operated, what did you next do about this invention?

A. We set about to improve the valve structure, improve the packer, and to demonstrate the apparatus in the field, making a great many tests without any charge. We did not begin to charge for tests until about November 1, 1926.

Q. Between March and November of that year you were continuously and busily engaged in demonstrating the operativeness of this invention?

A. Yes.

[fol. 73] Q. During that time you say you improved the valve and the packer. What do you mean by that?

A. Well, you see, this present device doesn't have an anti-friction bearing to carry the weight of the drill pipe, so we designed a valve of different structure, in which we could put an anti-friction bearing and make the valve easier to operate, that is, to rotate. With this present device it was necessary to use a special kind of lubricant, and then you had to suspend a certain amount of the weight of the drill pipe in order to rotate the device to operate the valve, and we designed a different type of device.

Q. Did you find that it was possible to use various styles of valve in this device?

A. Yes. There are any number of different types of device, of valve. We have designed a valve that operated by a clock mechanism, that operated by hydraulic mechanism, and operated in many ways.

Q. Did you work out two particular forms of valve that were incorporated in this tester for your commercial operations?

A. Yes, sir.

"Mr. Boyken: If your Honor please, I want to make the objection at this time that the two different forms that Mr. Halliburton is going to testify to do not come within the scope of the patent here in suit. One of these forms was the subject matter of a separate patent application which Mr. Halliburton himself filed in the Patent Office. I therefore

think any testimony relative to these two other forms has no bearing in the present suit, and I want to make that objection in advance.

[fol. 74] Mr. L. S. Lyon: I assume that we will show, or at least we expect to show that they employed them.

The Court: Yes. Let the objection be overruled.

Mr. Boyken: An exception."

The Court: Before you go into that, Mr. Lyon, I think we might as well take up the time now so that I will thoroughly understand just how this device works.

Mr. L. S. Lyon: Yes.

The Court: Start at the very bottom of the—what do you call it?

A. The testing apparatus?

The Court: With the very bottom of the hole.

A. Well, the bottom of the hole is usually——

The Court: Let me interrupt you. You first have your hole, which is drilled, I suppose, so that it has a flat bottom, we will say?

Mr. L. S. Lyon: Mr. Halliburton, I suggest that you use this sketch to help you show his Honor what he is asking about. This sketch was in the Patent Office as an illustration in our brief.

The Court: Well, you use that after. But in the first place, you are drilling your oil well to a depth, we will say, of 5,000 feet, and you want to make your test.

A. Yes.

The Court: And your hole is shaped at the end square across, or about that?

A. We will assume that he is going to set 6⅝ casing, and he is drilling, we will say, a 9⅞-inch hole to receive that casing. Now, it is the practice to core ahead and get samples ~~of~~ the formation.

The Court: In rotary drilling?

[fol. 75] A. Yes, sir; to determine whether or not the formation will produce or not. When they encounter or recover a sand that has sufficient porosity and will cut oil with ether, will show oil cut in ether and other means of testing it, then they use a tester. The hole that they have drilled ahead is smaller than the 9⅞-inch hole.

The Court: Now, you find out from my questions what I want to get at. You are in a formation and you want to make a test.

A. Yes, sir.

The Court: Just what is the shape of the bottom of your hole at that time?

A. Well, you see——

The Court: It has this core in it, hasn't ..?

A. No. The core has been taken out.

The Court: Suppose the core hasn't been taken out. You have got to have some core there. You never take out all of the core, do you?

A. Practically all of it, right to the bottom.

The Court: Well, we will say that all of the core has been taken out.

A. Yes.

The Court: Then the hole is practically square across, flat, isn't it?

A. Yes, sir.

The Court: And then you are going to make your test at this point?

A. Yes.

[fol. 76] The Court: The next thing you do is to drill a smaller hole in the middle?

A. Yes. But what they do, they drill the small hole ahead, and after they drill sufficient ahead then they ream that hole down.

The Court: To the shape of that conical affair that you have there?

A. Not necessarily that shape. In looking for the sand they drill this small hole ahead, and maybe drill 100 feet, and if they don't encounter a sand in drilling ahead, then they ream that down.

The Court: What term are you using—ream?

A. Yes, ream that, so that the core hole will have the same size as the hole above. And they continue to do that until they encounter a formation that is favorable to test. Then they always have a small hole ahead when they encounter a formation that is favorable to test.

The Court: Why do they have a small hole ahead? Do you mean that that is the way they regularly do?

A. That is the way they regularly drill.

The Court: I understand you now.

A. And that leaves a shoulder, and this packer sits on or wedges into that shoulder, pressing against the formation at that point.

The Court: And it must be tight into the shoulder, and it is made of rubber so as to insure perfect tightness?

A. Yes, your Honor.

The Court: Now, all above that is this fluid?

A. Yes, sir.

The Court: What do you call it?

A. Drilling fluid.

[fol. 77] The Court: Drilling fluid; and below that is drilling fluid too, of course?

A. Yes.

The Court: Very well. I can understand how that is wedged in the hole. Now, what is below the——

A. Well, you have just a perforated pipe that screws onto this collar here, so that you keep any lumps of cuttings from coming up in and stopping up the ports in the valve.

The Court: Is that the reason for the perforations?

A. Yes, that is one of the reasons.

The Court: Those holes, those two little holes—I will call it testing fluid—allow the testing fluid—it means whatever comes into the trap?

A. Yes, your Honor.

The Court: Allow that to go into the chamber above there?

A. Yes.

The Court: And you merely withdraw that and test it?

A. Yes, but you close the valve before you withdraw it.

The Court: Of course, to prevent anything else from getting in?

A. If you packed it off the hydrostatic pressure of the fluid on the outside would rush up into the drill pipe.

The Court: Well, the valve is a very important feature of your device?

A. Yes, to be positively controlled, so that you can open and close it for your test.

[fol. 78] The Court: You must open and close it to insure that you are testing the formation you want to test?

A. Yes. In othe words, you have got to open it inward to get the fluid into the test chamber, and then it is very important that you close it to keep the fluid from the outside from running down on the outside and running into the pipe.

The Court: You have to close it at the top and at the bottom too?

A. No, just at the bottom, your Honor. No fluid can get through it when the valve is closed, so, whatever fluid is entrapped in the pipe, you will see it when you disconnect the joints of pipe as the pipe is being removed from the well.

The Court: Otherwise the fluid, due to the pressure, would force itself up, and you would have just drilling fluid?

A. Yes. You wouldn't know where your test came from.

The Court: Is that all there is to this device?

A. Well, you seem to understand it, your Honor.

The Court: All right.

By Mr. L. S. Lyon:

Q. I show you a drawing, a print of a drawing, marked No. 60. Does that correctly illustrate the setting of this tester at the bottom of the well for the taking of the test?

A. Yes.

Q. Will you show that to the Court and explain the different parts to the Court?

A. You see, your Honor, this is a "rat-hole," a reduced hole, and this is your perforated pipe, and this is your packer set in the shoulder above the formation to be tested. [fol. 79] In other words, the "rat-hole" is drilled into what is supposedly oil and gas formation, and then the valve structure of the apparatus is just above the packer, attached to the valve structure, so that the fluid in back of the drill pipe is sealed off by the packer, so that any oil or gas or water in the formation below the packer can enter the perforations and up through the valve when the valve is open, and into the drill pipe.

The Court: Up until the time that valve is opened this is entirely empty?

A. Yes, your Honor. That drawing was made 12-18-26, by A. B. Stoddard.

Mr. L. S. Lyon: The drawing which the witness has just identified is offered in evidence as Plaintiffs' Exhibit No. 11.

The Clerk: Plaintiffs' Exhibit No. 11.

(Book of Exhibits, p. 223.)

By Mr. L. S. Lyon:

Q. Now, Mr. Halliburton, you said that following the demonstrations with Exhibit No. 9 you designed some improvements in the valve structure. I call your attention to Exhibit No. 5 in the Texas case, which I have here, and ask you if you can identify that model.

"Mr. Boyken: May it be understood, your Honor, that my objection goes to all these questions, on the ground that they are separate inventions, the subject matter of a separate application?

"The Court: Yes. Very well."

A. Yes, I can identify this.

[fol. 80] Q. What is it?

A. It is a small model of a device that we developed, a testing device, having a different valve structure from the original Simmons device, Exhibit 9.

Q. When was this last form of valve structure and device designed?

A. I think the detail drawings were completed about the 1st of June, 1926, and the first device was made in June or July, 1926.

Q. Is that one of several designs that you had drawn up of different valves that could be used in this invention?

A. Yes.

Q. Is this particular one a model of a form that was adopted for commercial use?

A. Yes.

Q. Now, will you take the model apart and explain how this particular device works?

A. This device is so constructed that we could get an anti-friction bearing to carry the weight of the pipe when the pipe was rotated to operate the valve. We have here a stop cock, in other words, just a core constructed as a stop cock, with a gear on this upper one engaging a gear on the stop cock. The stop cock can be rotated at right angles. You can see through it and see the valve open and close.

The Court: Am I supposed to see through this?

A. Yes. You can see through it. You can't see through it unless the valve is rotated. You can see the opening and closing of the valve.

The Court: Yes. Where is the valve?

A. Here is the valve.

[fol. 81] The Court: Very well.

A. That is just an ordinary plug of a stop cock.

By Mr. L. S. Lyon:

Q. You call that device your stop cock device?

A. Yes. You see, it has a slot in it, with a seat that limits the movement, the same as the original device. The only difference is that the slot is in the upper member, and, instead of being on the face of it, is cut around one-quarter of the circumference.

Q. In the operation of this stop cock device would the steps performed in making a test be any different from those performed in making a test with Exhibit 9?

A. They would be identical. You would run the testing apparatus into the well with the valve closed, set the packer above the formation to be tested, to seal off the fluid from above the packer, rotate the pipe, and open the valve, and after the valve has been opened a sufficient time to take a test, rotate the pipe in the reverse direction and close the valve, and withdraw the apparatus with an entrapped sample. The rotation of the device, the opening and closing of this device, is identical with the other device, so far as the operation of the drill pipe or the steps taken in making a test are concerned. The only difference is in the structure of the valve.

Q. I show you a drawing, No. 21, dated Duncan, Oklahoma, 4-22-26. Is that a drawing of the stop cock device that you have just explained the model of?

A. Yes.

Q. That is a print from the original drawing made in April, 1926, is it?

A. Yes. This shows the stop cock, and this is the gear, and this is the ball bearing, and this is the little pipe that [fol. 82] communicates with the stop cock when the stop cock is open and admits the fluid into the drill pipe. This shows the packing that packs the fluid off to keep it from entering the apparatus, and it shows the operation with the perforations and the packer, and it is a drawing of this exact device.

The Court: Mr. Lyon, you are suing only on the one patent?

Mr. L. S. Lyon: That is correct, but I am leading up to the fact that there is no other patent; there is no patent on these later forms. The situation that I expect to prove is that, after Mr. Halliburton acquired this original invention from Mr. Simmons, that he had engineers improve the valve structure. There is no legal reason that I know of why you are not entitled to take your invention and change the form if you can figure a better form, and it was in this later form that it was commercialized, rather than in the first original conception of the form that Mr. Simmons put it in. For instance, with the Bell telephone you couldn't hear over the original patented form, but it wasn't long before they could, from the invention, develop practical forms. It happens that his original form worked and can still be worked, but the engineers were able to provide a better form of valve.

The Court: But is the other of any importance in the vital elements of the litigation?

Mr. L. S. Lyon: I think not, except that I want to bring in the figures and the commercial success of this invention, and I don't want there to be any doubt but what these commercial forms embody the original invention, and I want your Honor to see just how they are related to it, just exactly what the differences are.

[fol. 83] The Court: Is there a patent on this?

Mr. L. S. Lyon: No, your Honor.

The Court: On this later device?

Mr. L. S. Lyon: No.

Mr. Boyken: There was an application, your Honor, and it was later abandoned.

Mr. L. S. Lyon: The Patent Office rejected it on the ground that it was all covered by the original Simmons application.

Mr. Boyken: Well, that is hardly so. We will introduce that in evidence later on, then, the application.

Mr. L. S. Lyon: I would like to first offer the model which the witness explained to the court of the stop cock device. I offer that as Plaintiffs' Exhibit No. 12.

The Clerk: Admitted, your Honor?

The Court: Yes.

Mr. L. S. Lyon: And then the drawing of the stop cock device, as Plaintiffs' Exhibit No. 13.

The Court: Admitted.

Mr. L. S. Lyon: I will ask that that be so marked.

The Court: They will be admitted.

By Mr. L. S. Lyon:

Q. In addition to this stop cock device did you design or have designed another form of valve structure to be used with this invention?

A. Yes.

Q. Mr. Halliburton, you were about to explain this next form of tester by reference to the model, Plaintiffs' Exhibit No. 19 in the Texas case. What do you call this form?

A. This is known as the "J" type tool. ~~The valve~~ is operated by rotating the pipe to the right and lowering away to open the valve and just picking up to close the [fol. 84] valve. This device will operate in a hard formation and the operation of the valve is very positive and is very satisfactory where the formation is not too soft and where the packer might follow down in the "rat-hole."

Q. I think you had better explain that a little more fully to the Court, the differences in these formations, what you mean by that and why one of these tools is better for one formation and another one is better for another formation.

A. Of course, in drilling an oil well you encounter all kinds of formations, and at times you might want to test where the point at which you set the packer would be a soft, unconsolidated formation. The packer has to hold up the weight of the drill pipe and the weight of the fluid, and in soft formations sometimes the packer will follow down the "rat-hole." With the stop cock type of device and the original Simmons device, Exhibit No. 9, the packer can be set in the top of the "rat-hole" and the valve rotated and opened and at the same time hold up on the packer so that it will not follow down the "rat-hole." With what we call our "J" type device you have to hold a pressure and a portion of the weight of the drill pipe down on the valve structure in order to hold the valve open. And you cannot hold up on the packer and at the same time keep the valve open. With the "J" type device, if the seat or packer follows down the "rat-hole," it immediately closes the valve, while with the stop cock type device, the Halliburton commercial device and with the original Simmons device, it is possible to hold up on the packer and at the same time keep the valve open. So in hard formations a device, where it

takes pressure to keep it open, is satisfactory but in soft [fol. 85] formations it is better to have a device where you can hold up on the packer and at the same time keep the valve open.

Q. Will you take this model of the "J" type tool device apart and explain to the Court how it is constructed? Show what position the parts are in when the device is being lowered down the well on the end of the drill pipe.

A. Ordinarily as it is lowered into the well this pin on the mandrel is in the top part of this slot.

Q. When the valve is closed?

A. When the valve is closed. It has a pocket type valve in the bottom of it. The valve can be seen in that member.

Q. Explain the operation of the valve when you have seated the packer.

A. When the packer is seated, which is screwed onto this member, by turning to the right this pin follows this "J" slot and you lower the pipe away, causing the pin to follow the "J" slot, and as the pipe is lowered away the mandrel comes down.

Q. This moves down?

A. This member moves down and strikes the valve and shoves the valve off of its seat. Then, to close the valve you pick up the pipe at the top of the well and the pin automatically follows the slot around, closing the device so that, if you let weight down on it again, it will not open the valve but will work up and down in the slot. This device is so constructed that when it is run in the hole and the packer strikes an obstruction it will not open the valve. It does not open the valve until the pipe is lowered away and turned to the right at the same time, and it is automatically closed by just picking up the pipe. The advantage of the device [fol. 86] is that it is possible to spud it, jam*b* it into a tight hole or shove it past an obstruction in the well without opening the valve. And that is the purpose of the "J" slot, is to be able to do that. On the other hand, if the seat gives way, the valve will close and you can pick the device back up and spud the tester to a new seat without opening the valve until you have gotten the packer firmly in the "rat-hole," on the shoulder of the "rat-hole" again.

Q. With the exception of the difference in the valve structure that you have explained, is this "J" tool device used and employed in the same way and operated by the same

steps as the original Simmons device that you have described?

A. Yes. The only difference is in the way in which the pipe is moved to operate the valve.

Q. But in both devices the valve is opened and closed from the top of the well by movement of the pipe, is that correct?

A. Yes.

Mr. L. S. Lyon: I will offer in evidence the model of the "J" tool device as Plaintiffs' Exhibit No. 14.

Q. I show you a drawing, a print of a drawing, dated 1/25/34, "Halliburton Oil Well Cementing Company, Duncan, Oklahoma." Is that a print of the original drawing of this "J" tool device that you have just explained to the Court?

A. Yes.

Q. Will you point out to the Court the parts of the "J" tool device as they appear on this drawing?

A. The valve itself is a pocket valve, shown at the bottom of the device, with the mandrel that comes down to open the valve. The mandrel is now at the top position, with the [fol. 87] valve closed. The device has a fluid chamber where the hydrostatic pressure of the fluid within the well can enter, which keeps the device in the top position with the exception of when it strikes an obstruction. And, if the packer strikes an obstruction that is greater than the hydrostatic pressure against the piston, then the pins operating in the slot will come down in the upper position of the slot and the weight of the drill pipe will be held by those pins.

Q. Without opening the valve?

A. Without opening the valve; yes. If it wasn't for this pressure chamber, you couldn't operate it.

Q. Will you point out to the court on this drawing the slot that you demonstrated here?

A. The slot is designated up here with the pin in it.

Q. That is just a detailed sketch of the slot off at the side, is it not?

A. Yes.

Q. And the pin appears there in the actual device?

A. Yes.

Q. And the slot is formed in this outer casing here?

A. In the outer casing.

Q. Do you regard these two forms of devices the "J"

tool and the stop cock device, as different inventions from the Simmons invention which you purchased?

A. The stop cock and the "J" type tool are embodied in the Simmons invention. They might constitute patentable novelty themselves and still come within the Simmons invention.

Q. Do you mean by that that they are improvements on the Simmons invention?

A. Yes.

[fol. 88] Q. And they utilize all the principles of the Simmons invention, do they?

A. Yes.

Mr. L. S. Lyon: The drawing of the "J" tool device, which the witness has identified, is offered in evidence as Plaintiffs' Exhibit No. 15.

(Book of Exhibits, p. 224.)

Q. Will you assemble these two models, unless the court wants to see them again?

The Court: You had better put them together. Or I would suggest leaving that large exhibit as it is, Exhibit No. 9, I believe it is. Undoubtedly it will be taken apart again before the case is over.

By Mr. L. S. Lyon:

Q. Will you take the witness stand again, Mr. Halliburton? After you had completed these designs of the "J" tool and the stop cock device did you put those in regular commercial use?

A. Yes. But we continually worked to improve the packers and valves and equipment, the accessories and equipment for testing.

Q. When were these devices put into commercial use, regular commercial use, by you?

A. The stop cock device was put into commercial use about the 1st of November, 1926. The "J" type tool has been in commercial use a year and a half, I guess, or perhaps two years.

Q. And those are the two forms of tools that you have used in your commercial testing operations?

A. Yes.

[fol. 89] Q. Where have you conducted those testing operations? To what territory has your business extended?

A. Louisiana, Arkansas, Mississippi, Texas, Oklahoma, New Mexico, Colorado, Wyoming, Montana, California and some tests in Mexico and Canada.

Q. By reference to a memorandum here can you tell us by years the number of jobs or tests that have been made with the tools that you have identified?

A. Yes.

Q. The tests beginning in 1926 and through June, 1931 were made by what organization?

A. They were made by the Erle P. Halliburton Company, a partnership.

Q. Who were the partners?

A. My wife, Mrs. Halliburton, and myself.

Q. That was the form of the organization conducting this business at that time, is that correct?

A. Yes.

Q. Can you tell us by months and years the number of tests that were made by that organization from 1926 to and through June, 1931?

A. In November, 1926 there were four tests made and in December, 1926 there were 17 tests made, making a total of 21 commercial tests which we charged for in 1926. We made additional tests prior to that time which I do not have any definite record of.

Q. Where no charge was made?

A. No charges were made for them. In 1927, in January, we made 35 tests; in February, 31 tests; in March, 54 tests; in April, 45 tests; in May, 44 tests; in June, 47 tests; in July, 16 tests; in August, 35 tests; in September, 50 tests; in October, 55 tests; in November, 57 tests, and in December, [fol. 90] 38 tests, making a total of 527 tests for 1927.

In 1928 we made 30 tests in January, 20 in February; in March, 29; in April, 38; in May, 34; in June, 31; in July, 35; in August, 22; in September, 36; in October, 27; in November, 27 and in December, 28, making a total for 1928 of 337 tests.

In 1929 we made, in January, 27 tests; in February, 19 tests; in March, 36 tests; in April, 46 tests; in May, 36 tests; in June, 27 tests; in July, 32 tests; in August, 31 tests; in September, 38 tests; in October, 36 tests; in November, 41 tests, and in December 35 tests, making a total of 404 tests in the year 1929.

Mr. Boyken: Mr. Lyon, why not put this in evidence? We won't offer any objection to it.

Mr. L. S. Lyon: I am perfectly willing to put the memorandum that the witness has in evidence, have it copied into the record, with the understanding that it is his testimony, if that is satisfactory to counsel.

The Court: Very well.

Mr. Boyken: Yes. There is no dispute as to the number of these tests.

The Court: Very well.

By Mr. L. S. Lyon:

Q. Then the first sheet gives the data on the tests and the dates of the tests by the Erle P. Halliburton Company, is that correct?

A. Yes. But I notice that for July, 1931 and March, 1930, inclusive, there is no record here. I account for that by the fact that the books were moved to California and these records were taken from Duncan. There were about 300 tests made during that period.

[fol. 91] Q. But this record from November, 1926, to June, 1931, shows a total of 1882 tests made with the "J" tool, is that correct?

A. Yes.

Mr. L. S. Lyon: I will ask that this be copied into the record at this point as part of the witness' testimony.

The Court: Very well.

(The memorandum above referred to is as follows):

Tests Made by Erle P. Halliburton Company

	1926	1927	1928	1929	1930	1931
Jan.		35	30	27	29	23
Feb.		31	20	19	47	11
March		54	29	36	64	33
April		45	38	46	59	23
May		44	34	36	37	27
June		47	31	27	35	14
July		16	35	32	31	
Aug.		35	22	31	33	
Sept.		50	36	38	35	
Oct.		55	27	36	37	
Nov.	4	57	27	41	37	
Dec.	17	38	28	35	18	
	21	527	337	404	462	131

1882

[fol. 92] By Mr. L. S. Lyon:

Q. Turning to the next sheet of the memorandum—I should have said stop cock tools, should I not? The stop cock device was used in those tests?

A. The Simmons invention; yes.

Q. I mean the device is what we have called the stop cock tool here, is that correct?

A. Yes.

Q. Turning to the second sheet of the memorandum, is this a correct statement of the wells tested by the Halliburton Oil Well Cementing Company from April 1, 1932, to September 30, 1935?

A. Yes.

Mr. L. S. Lyon: I ask that this statement be copied into the record at this point.

(The memorandum above referred to is as follows):

[fol. 93] Statement of Wells Tested by Halliburton Oil Well Cementing Company During Period from April 1, 1932, to September 30, 1935, Inc.

	1932	1933	1934	1935
January	..	70	80	231
February	..	51	90	201
March	..	46	128	246
April	35	41	123	269
May	30	38	121	249
June	43	29	140	247
July	29	38	156	318
August	40	57	150	359
September	41	31	210	334
October	31	56	166	
November	41	91	197	
December	39	115	210	
Totals	329	663	1,771	2,454

Total for Period, 5,217.

State of Oklahoma,
County of Stephens, ss:

L. D. Campbell of lawful age, being duly sworn on his oath, states that he is Assistant Secretary of Halliburton Oil Well Cementing Company, a corporation;

[fol. 94] That the above is a true and correct statement of the number of well testing jobs performed by Halliburton Oil Well Cementing Company between April 1, and September 30, 1935, inclusive, as reflected by the well reports, invoices and books of account of said company in his possession.

L. D. Campbell.

Subscribed and sworn to before me this 4th day of November, 1935. Gladys W. Roberson, Notary Public. My commission expires 12-29-1936. (Notarial Seal.)

By Mr. L. S. Lyon:

Q. It shows during that period a total of 5,217 tests made, is that correct?

A. Yes.

The Court: Tests with what?

By Mr. L. S. Lyon:

Q. What were those tests made with?

A. Nearly all of those tests were made with the stop cock type device. A few of them were made with the "J" tool device.

Q. So altogether, up to September, 1935, something over 7,000 tests have been made by your organization with this Simmons invention, is that correct?

A. Yes; about 7500 tests.

Q. And were those successful tests?

A. Yes.

Q. As the term has been defined in your testimony?

A. Yes.

[fol. 95] Q. And were paid for by the customers?

A. These were charges; yes.

Q. Can you give the Court some idea of the extent to which this Simmons invention has been adopted for general standard use by the oil companies in the United States since you introduced it?

A. All operators, or practically all as far as I know, use this method of testing a well now.

Q. In preference to the old method of setting casing and bailing?

A. Bailing and swabbing; yes.

Q. When you first introduced this Simmons invention to the industry your application for patent was pending, is that correct?

A. Yes.

Q. And your patent didn't issue for some seven years after you started the business, is that correct?

A. Yes.

Q. And what happened in regard to others copying or imitating what you were doing?

A. There were numerous people engaged in the business. I doubt if we did as much as half of the testing.

Q. When did these other people start in? Did any of them start before you did?

A. No.

Mr. Boyken: I don't think that is material, your Honor, how many other people may have copied Mr. Simmons' patent. The question is whether the patent is a good patent and whether the defendants in this case infringe. I don't see why we want to try all of these other people.

[fol. 96] Mr. L. S. Lyon: I think it is proper to show in connection with the merits of the invention, your Honor, that after he introduced this and while he had no patent to stop others it was of sufficient importance and value so that other people started in the same business, and among those we will show the defendants in this case.

Mr. Boyken: The issue should be confined to the present defendants in this suit, your Honor.

The Court: The objection is sustained with reference to any other than the defendants here.

By Mr. L. S. Lyon:

Q. Has this Simmons invention which you have explained to the Court been universally adopted in the oil fields for making formation and casing tests?

A. Yes.

Q. For how long a time has it been so adopted?

A. Since 1927 and during 1927 it came into general public use.

Q. And is it being used today?

A. Yes.

Q. Throughout the oil fields of this country?

A. Yes.

Q. Do you know Mr. M. O. Johnston here in the courtroom?

A. Yes.

Q. He is the directing head of the defendant M. O. Johnston Service Corporation in this case, is he?

A. Yes.

Q. Tell us what you know about how he came to engage in this testing business and the use of the tester that this suit is being brought against.

[fol. 97] Mr. Boyken: If your Honor please, I have no objection to Mr. Halliburton stating what he personally knows about this thing but I do object to the general form of the question if it includes what anybody else may have told him.

The Court: He is asked what he knows.

Mr. L. S. Lyon: Yes, your Honor.

Mr. Boyken: Of his own knowledge.

The Court: Yes. You must confine your answer to that, Mr. Halliburton, to your own knowledge.

Mr. L. S. Lyon: Or anything that Mr. Johnston himself has admitted to him.

The Court: Whatever he knows that Mr. Johnston has said would be a form of admission and, naturally, that would be admissible.

A. I know that Mr. Johnston has been engaged in the testing business both in Arkansas and the Midcontinent and out here. He was associated with his brother back in the Midcontinent and he used the same type of tool and operated there as the Johnston Formation Testing Corporation.

By Mr. L. S. Lyon:

Q. You are familiar with the construction and operation of the tester employed by the defendants in this case, are you?

A. Yes.

Q. When and where did that first appear in use in the fields to your knowledge?

A. Well, in its present form I wouldn't know the exact date but E. C. Johnston first went into the testing business in Eldorado in March or April, 1927, after I had introduced the testing business and sent an apparatus there to make tests.

[fol. 98] Mr. Boyken: I move to strike that out because that is a different Mr. Johnston and is not the present Mr. Johnston in this case. I think we are not bound by what somebody else may have done.

The Court: Read the answer, Mr. Reporter.

(Answer read by reporter.)

Mr. Boyken: The M. O. Johnston Company is the defendant in this suit.

A. I believe that his affidavit in this case states that he was engaged in the testing business back there.

By the Court:

Q. Who is this other Johnston you are speaking of?

A. He is a brother of M. O. Johnston.

Q. What are his initials?

A. E. C., or Edgar Johnston.

The Court: The witness merely states that E. C. Johnston went into the testing business.

Mr. Boyken: Yes, your Honor. And I move to strike that out as being irrelevant and not binding on the present defendants.

The Court: I am not able to say at the present time what importance or relevancy it might have. It may became material but that is not indicated at the present time. The motion will be denied at present.

Mr. Boyken: An exception.

By Mr. L. S. Lyon:

Q. How long after E. C. Johnston started in the testing business was it before M. O. Johnston started to your knowledge?

A. Well, I wouldn't know just when they became associated together in the business.

[fol. 99] Q. Was M. O. Johnston in the business before E. C. Johnston started?

A. E. C. Johnston as far as I knew was at the head of their testing business and is the one that was involved in an interference with us. The information that I get regarding M. O. Johnston's connection with E. C. Johnston is contained in his affidavit filed in this case.

Q. In any event, it was after you had introduced this Simmons invention and demonstrated it in the oil fields

before M. O. Johnston or any of his brothers started in the business, is that correct?

A. Yes; that is true. Beginning in 1927, and just after I started to charge for making tests, there was the Lewis Oil Well Testing Company, the Johnston Formation Testing Corporation and the Houston Engineers, Incorporated, and lots of operators had their own tools made, including the Gulf Production Company. And I would say that by the end of 1927 there were some 25 or 30 people engaged in the testing of oil wells, using this Simmons invention.

Mr. Boyken: If your Honor please, I move to strike that out on the same grounds as the objection which was sustained heretofore.

The Court: The motion is granted.

Mr. L. S. Lyon: An exception, your Honor. As a foundation for the witness' testimony I would like to read and refer to the affidavit of Mr. M. O. Johnston in this case, [fol. 100] filed on the motion for a temporary injunction, in which he states——

The Court: Is he a defendant?

Mr. L. S. Lyon: He states that he is an officer, to-wit, the president of the defendant M. O. Johnston Oil Field Service Corporation.

Q. The particular operations of the defendants which you complain of in this case have occurred here in California, have they?

A. Yes.

Q. Have you your testing service in operation here in California?

A. Yes.

Q. And you maintain a staff of men and the equipment here to do the work here, do you?

A. Yes.

Q. And it is available to the oil companies at your regular established rates?

A. Yes.

Q. And are the operations of the defendants that you complain of in direct competition with your service?

A. Yes.

Mr. L. S. Lyon: If your Honor please, I would like to pause for a moment to offer in evidence the defendants' interrogatory answers and the exhibits thereto describing

their device, and then have the witness explain the device and compare it with those drawings.

The Court: Yes. Very well.

[fol. 101] Mr. L. S. Lyon: It is going to take a good deal of time to read these, your Honor. I would like to offer in evidence Interrogatories 16 and through Interrogatory 32, that is, from Interrogatory 16 to 32 inclusive, and the answers thereto of the defendant M. O. Johnston Oil Field Service Corporation and of the defendant Honolulu Oil Corporation. There is one set of questions and two sets of answers, one by one defendant and the other by the other defendant. I ask that those be copied and considered as having been read in evidence.

Offer in Evidence

(The interrogatories above referred to and the answers thereto are as follows:)

"XVI

"Attached to those Interrogatories and marked Exhibit A. and made a part hereof, is a drawing containing Figures 1 and 2.

"Fig. 1 is a drawing in section of a testing device employing what is known to the oil industry as a 'rat hole packer.'

"Fig. 2 is a drawing of a testing device partly in section and has the same mechanical construction as the device shown in Fig. 1 with the exception that it employs what is known as a 'sleeve packer.'

"Referring to said Exhibit A., please state

(a) do these drawings correctly show the device or devices manufactured by the defendant Johnston Oil Field Service Corporation;

[fol. 102] (b) do these drawings correctly show the device or devices used by the defendants, or either of them, since October 17, 1933, in testing formations in wells;

(c) if your answers to either subdivisions (a) and (b) of this Interrogatory is not in the affirmative, please explain in what particular or particulars such drawings differ from (1) the device manufactured by the defendant Johnston Oil Field Service Corporation, and (2) the devices used by the

defendants, or either of them, in the testing of formations in wells; (3) furnish copies of clear drawings or blueprints of such testing devices so manufactured and used by said defendants, or either of them, in the testing of wells;

(d) describe the mode of operation of each of the devices referred to in your answers to subdivisions (a), (b) and (c) of this Interrogatory."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 16 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 16 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

[fol. 103] "XVII

"In testing formations in a well containing drilling fluid did the defendants, or either of them, since October 17th, 1933,

(a) lower an empty string of pipe carrying a packer and having a closed valved inlet at its lower end to adjacent the formation to be tested;

(b) set the packer above the formation to be tested to seal off the drilling fluid;

(c) open the valved inlet after the packer is set to permit the fluid from the formation below the packer to enter the pipe;

(d) close the valved inlet against the entrance of fluid from the well by movement of the pipe;

(e) raise the closed pipe to remove an entrapped sample from the well."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 17 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 17 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

[fol. 104] "XVIII

"In testing formations in a well containing drilling fluid, did the defendants, or either of them, since October 17th, 1933,

(a) lower only a single string of pipe carrying at its lower end a packer and a closed valved inlet through the drilling fluid in the well;

(b) set the packer above the formation to be tested;

(c) open the valved inlet allowing the fluid contained in the formation being tested to enter the pipe through the inlet;

(d) close the valve to prevent the entrance of the fluid from the well through the inlet;

(e) release the packer;

(f) raise the string of pipe with the valved inlet closed against entrance of the fluid in the well to remove an entrapped sample."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 18 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 18 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

[fol. 105] "XIX

"If your answers to either or both of Interrogatories XVII and XVIII are not in the affirmative, please give a full and complete description of all apparatus and methods used by the defendants or either of them, in testing formations in wells where only a single test string is employed, since October 17th, 1933."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 19 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 19 is as follows:)

"Interrogatories 16 to 19, Inc.

"See answers to Interrogatories 24 to 33, infra."

"XX

"When did you first learn of United States Letters Patent No. 1,930,987 in suit?"

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 20 is as follows:)

"Interrogatory 20

"On or about the 18th of October, 1933."

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 20 is as follows:)

"Interrogatory 20

"On or abont the 24th day of October, 1933."

[fol. 106] "XXI

"Were you, at any time prior to the filing of the Bill of Complaint herein, notified in writing by the plaintiffs, or either of them, to cease infringement of the Letters Patent in suit."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 21 is as follows:)

"Interrogatories 21 and 22

"On or about the 18th of October, 1933, we received from Leonard S. Lyon, a letter in words and figures, as follows:

"Los Angeles, California,
October 17, 1933.

Via Registered Mail

Johnston Formation Testing Co., 1521 Grand View Avenue, Glendale, California.

GENTLEMEN:

This is to advise you of the grant today by the United States Patent Office of Letters Patents No. 1,930,987, dated October 17, 1933, on an application filed February 10, 1926, covering Method and Apparatus for Testing the Productivity of Formations Encountered in Wells. This patent is owned by Mr. Erle P. Halliburton of Los Angeles, California, and the exclusive license to employ throughout the United States the invention patented therein is held by [fol. 107] Halliburton Oil Well Cementing Company of Duncan, Oklahoma, having an office at 810 South Spring Street, Los Angeles.

Our attention has been called to the Johnston Formation Tester being offered for rent or sale by you. The manufacture, use or sale of this device in our opinion will constitute an infringement of the above Letters Patent. On behalf of our clients, Mr. Erle P. Halliburton and Halliburton Oil Well Cementing Company, you are hereby warned to desist from any further manufacture, use or sale of the formation tester aforesaid. We are instructed to file suit against you in the United States District Court for infringement of the above Letters Patent if this notice is disregarded.

May we have your prompt reply in order that we may know whether it is necessary for us to instigate suit against you.

Yours very truly, Leonard S. Lyon.'"

LSL:EF.

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 21 is as follows:)

"Interrogatories 21 and 22

"On or about the 24th day of October, 1933, we received from Erle P. Halliburton and Halliburton Oil Well Cementing Company, a letter in words and figures as follows, to wit:

[fol. 108] 'October 23, 1933.

Honolulu Oil Corp., Ltd., Box 'H', Taft, California.

GENTLEMEN:

This is to advise you of the grant of United States Letters Patent No. 1,930,987, dated October 17, 1933, on Apparatus of Testing the Productivity of Formations in Wells. This patent is owned by Erle P. Halliburton of Los Angeles, California, and exclusive license to employ the invention patented therein throughout the United States is held by Halliburton Oil Well Cementing Company of Duncan, Oklahoma, having an office at 810 So. Spring Street, Los Angeles.

Our attention has been called to the formation tester furnished to you by M. O. Johnston Oil Well Service Corp., and it is our opinion that the use of this formation tester will constitute an infringement of the above Letters Patent. On behalf of myself as owner of United States Letters Patent No. 1,930,987 and of the Halliburton Oil Well Cementing Company as licensee, you are hereby warned to desist from any further infringing acts or we shall be compelled to file suit against you in the United States District Court for infringement of the above Letters Patent if this notice is disregarded.

We would appreciate your prompt reply stating whether it is your intention to abide by this notice of your infringing the above Letters Patent in order that we may know whether it is necessary for us to file an infringement suit against you. [fol. 109] The Halliburton Oil Well Cementing Company maintains in this district first class equipment and skilled operators and we will greatly appreciate an opportunity to demonstrate our ability to render an efficient, satisfactory testing service. We also wish to express our appreciation for the business which your Company in the past has given us.

Yours very truly, Erle P. Halliburton and Halliburton Oil Well Cementing Co., by Erle P. Halliburton'."

eph-ds.
(s.)

"XXII

"If your answer to Interrogatory XXI is in the affirmative produce and file in response hereto any and every such notice, or a true and correct copy of the same, and state the date of receipt of same by you."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 22 is the same as its answer to Interrogatory No. 21.)

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 22 is the same as its answer to Interrogatory No. 21.)

"XXIII

"Please state which of the numerous patents set forth in Paragraph X of your answer will be relied upon merely to [fol. 110] show the state of the prior art and not for the purpose of anticipation."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 23 is as follows:)

"Interrogatory 23

"We will rely upon all of the patents collectively."

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 23 is as follows:)

"Interrogatory 23

"We will rely upon all of the patents collectively."

"XXIV

"Have the defendants, or either of them, since the 17th day of October, 1933, in the testing of formations in wells employed

(a) an empty string of pipe to be lowered into the well to adjacent the formation to be tested;

(b) a packer carried by the pipe adapted to be positively pressed against the wells of the formation to seal off same;

(c) means at the lower end of the pipe to receive a sample from the formation, including an inlet opening into the pipe

and a valve structure including a plurality of relatively movable parts, one of which is secured to the pipe and another of which is connected to the packer.

[fol. 111] "Answer each of the subdivisions of this Interrogatory separately."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 24 is as follows:)

"Interrogatories 24 to 33, Incl., and Interrogatories 16 to 19, supra

"We have attached hereto Exhibits "A", "B", "C", and "D" which fully and completely set forth the devices and apparatus used by us and which have been used by us subsequent to October 17, 1933, in connection with testing of the formation of oil wells and in making tests for casing shoe leaks and which exhibits completely set forth the mode and manner of operation of these devices and which are incorporated herein as though herein expressly set forth as a part of the answers to said interrogatories. Defendant objects to said interrogatories, and each and all of them, in so far as they require the comparison of these devices with the device of plaintiffs or other devices referred to in said interrogatories upon the ground that such interrogations do not call for a statement of fact but the expression of an opinion and which comparisons could be made by plaintiffs if so advised from the facts herein stated.

"Defendant further objects to said interrogatories in so far as they require defendant to construe the claims of the plaintiffs and the legal effect thereof in the making of such comparisons on the ground that the same does not require the statement of facts but endeavors to require defendant to perform the function of the court in the [fol. 112] matter of the litigation, and express legal conclusions in respect thereto."

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 24 is as follows:)

"Interrogatories 24 to 23 (33), Incl., and Interrogatories 16 to 19, Incl. supra

"Our only information concerning the matters enquired about in these interrogatories has been obtained from the

defendant M. O. Johnston Oil Field Service Corporation and we are advised by it that the devices and apparatus used by it upon wells owned by us subsequent to October 17, 1933, are those which are set forth and described in its answer to Interrogatories 23 to 34, inclusive, and Interrogatories 16 to 19, supra, and the exhibits attached to such answers and referred to therein, and basing our answer upon such information, we refer to and incorporate herein as our answer to said interrogatories the answer of said defendant M. O. Johnston Oil Field Service Corporation to Interrogatories 24 and 33, inclusive and Interrogatories 16 to 19, supra, on file in this proceeding and incorporate the same as though herein set forth at length.

"This defendant objects to said interrogatories and each and all of them in so far as they require the comparison of the devices of the M. O. Johnston corporation with the device of plaintiffs or other devices referred to in said interrogatories upon the ground that such interrogatories do not call for a statement of facts but the expression of an opinion and which comparisons may be made by plaintiffs, if so advised, from the facts herein by reference stated. This defendant further objects to said [fol. 113] interrogatories in so far as they require defendant to construe the claims of the plaintiffs and the legal effect thereof in the making of such comparisons on the ground that the same do not require a statement of facts but endeavor to require defendant to perform the function of the court in the matter of the litigation and express legal conclusions in respect thereto."

"XXV

"If your answer to any or all of the subdivisions of Interrogatory XXIV is not in the affirmative, please give a full description of the apparatus so used by defendants, or either of them in the testing of formation encountered in a well, and furnish clear drawings or blue prints of such apparatus."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 25 is the same as its answer to Interrogatory No. 24.)

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 25 is the same as its answer to Interrogatory No. 24.)

"XXVI

"Have the defendants, or either of them, since the 17th day of October, 1933 in the testing of formations in a well containing drilling fluid, used apparatus which includes

(a) a single empty string of pipe to be lowered into the well to adjacent the formation to be tested;

[fol..114] (b) means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said sealing means being adapted to be positively pressed against the walls of the formation to seal off the same;

(c) means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

"Answer each of the subdivisions of this Interrogatory separately."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 26 is the same as its answer to Interrogatory No. 24.)

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 26 is the same as its answer to Interrogatory No. 24.)

"XXVII

"If your answer to any or all of the subdivisions of the Interrogatory XXVI is not in the affirmative, please give a full description of the apparatus so used by defendants, or either of them, in the testing of formation encountered in a well, and furnish clear drawings or blueprints of such apparatus."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 27 is the same as its answer to Interrogatory No. 24.)

[fol. 115] (The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 27 is the same as its answer to Interrogatory No. 24.)

"XXVIII

"Have the defendants, or either of them, since the 17th day of October, 1933, in testing the productivity of a formation encountered in a well containing drilling fluid, used apparatus therefor which included

(a) a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested;

(b) a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same;

(c) means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer;

(d) a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

"Answer each of the subdivisions of this Interrogatory separately."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 28 is the same as its answer to Interrogatory No. 24.)

[fol. 116] (The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 28 is the same as its answer to Interrogatory No. 24.)

"XXIX

"If your answer to any or all of the subdivisions of Interrogatory XXVIII is not in the affirmative, please give a full description of the apparatus so used by defendants, or either of them in the testing of formation encountered in a well, and furnish clear drawings or blueprints of such apparatus."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 29 is the same as its answer to Interrogatory No. 24.)

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 29 is the same as its answer to Interrogatory No. 24.)

"XXX

"Have the defendants, or either of them, since the 17th day of October, 1933, in the testing of a formation encountered in a well containing drilling fluid, used apparatus for making such test or tests which includes

(a) a single empty string of pipe to be lowered into the well through the drilling fluid adjacent the formation to be tested;

[fol. 117] (b) A packer carried by the pipe for sealing off the well above the formation, said packer adapted to be positively pressed against the wall of the formation to seal off the same;

(c) an inlet below the packer opening into the pipe;

(d) a valve for the inlet.

"Answer each of the subdivisions of this Interrogatory separately."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 30 is the same as its answer to Interrogatory No. 24.)

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 30 is the same as its answer to Interrogatory No. 24.)

"XXXI

"If your answer to any or all of the subdivisions of Interrogatory XXX is not in the affirmative, please give a full description of the apparatus so used by defendants, or either of them in the testing of formation encountered in a well, and furnish clear drawings or blueprints of such apparatus."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 31 is the same as its answer to Interrogatory No. 24.)

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 31 is the same as its answer to Interrogatory No. 24.)

[fol. 118] "XXXII

"Have the defendants, or either of them, since the 17th day of October, 1933, in testing a formation in a well con-

taining drilling fluid and removing an entrapped sample from said formation from said well, used apparatus which included

(a) a string of pipe closed against the flow of drilling fluid as the pipe is lowered into the well;

(b) a packer carried by the pipe and adapted to be seated by manipulation of the pipe to seal off the well above the formation to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same:

(c) an inlet to the pipe communicating with the well below the point at which the packer seals off the well;

(d) means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set, and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well.

"Answer each of the subdivisions of this Interrogatory separately."

(The answer of the M. O. Johnston Oil Field Service Corporation to the above Interrogatory No. 32 is the same as its answer to Interrogatory No. 24.)

(The answer of the Honolulu Oil Corporation, Ltd., a corporation, to the above Interrogatory No. 32 is the same as its answer to Interrogatory No. 24.)

[fol. 119] Mr. L. S. Lyon: In connection with that I would like to offer in evidence, as Plaintiffs' Exhibits 16-A, -B, -C and -D, respectively, Exhibits A, B, C and D filed by the defendants as exhibits to their interrogatory answers. I might state, your Honor, that these constitute a series of drawings of the defendants' tester and Exhibit 16-A is a description of the tester and its operation.

Plaintiffs' Exhibit 16-A (Exhibit "A" to Defendants' Answers to Plaintiffs' Interrogatories).

"Exhibit A

"The Johnston testing tool used by the M. O. Johnston Oil Field Service Corporation is in three forms and for

three classes of work, to-wit: a form for testing formations by the use of a rat hole packer, a form for testing formations by the use of an open hole sleeve packer, and a form for testing casing leaks after the lower end of the casing has been cemented. These three types of devices are disclosed in the accompanying drawings marked Exhibits B, C, and D. The disclosures on these drawings are as follows:

Exhibit B:

Fig. 1 is a view in partial vertical section and in elevation showing the valve structure of the Johnston testing tool, irrespective of which type of packer is to be used.

Fig. 2 is a view in partial vertical section and elevation showing the packer section used in making tests of well casing for casing shoe leaks.

[fol. 120] Fig. 3 is a view in partial vertical section and elevation showing a rat hole packer used with the structure of Fig. 1 when formation tests are made.

Fig. 4 is a view in partial section and elevation showing a sleeve packer used with the structure of Fig. 1 when tests are to be made in open hole.

Fig. 5 shows two enlarged companion views in vertical section of the trip valve in closed and open positions.

Exhibit C:

Fig. 1 is a view in partial vertical section and elevation showing the Johnston testing tool equipped with a rat hole packer and going into the hole.

Fig. 2 is a view of the structure shown in Fig. 1 in its testing position.

Fig. 3 is a view of the structure shown in Fig. 1 coming out of the hole.

Exhibit D:

Fig. 1 is a view of the Johnston tester equipped with a hooked wall packer for making tests for casing shoe leaks and discloses the tool going into the hole.

Fig. 2 is a view of the structure shown in Fig. 1 with the tool in a testing position within the casing.

Fig. 3 is a view showing the structure of Fig. 1, with the tool being removed from the casing.

Referring to Exhibit B, it will be seen that a drill pipe 5 is threaded at its lower end and receives a coupling collar 6. The lower end of this collar is threaded into a trip valve housing 7. This housing is formed with a central bore 8 having a reduced threaded portion 9 at its lower end, and [fol. 121] beneath which a threaded bore 10 occurs to receive the upper threaded end of a keyed mandrel 11. The reduced threaded bore 9 receives a renewable valve seat 12 upon which a ball valve 13 is seated and by which a port 14 through the renewable valve seat 12 is normally sealed. Disposed above the valve ball 13 is a valve body 14. The lower end of this is reduced in diameter as indicated at 15, and is formed at its end with a retaining seat 16 for the ball 13 and is circumscribed by a spring 17 which rests upon the seat 12 and is compressed by a collar 18 formed as a part of the valve body 14. The upper portion of the valve body is cylindrical as indicated at 19 and reciprocates within a tubular retainer nut 20 which is threaded into the upper end of the housing 7. A spring collar 21 is seated within a groove around the extension portion 19 of the valve body 14 and expands against the bore of the retainer, and will expand to a locking position at the end of the retainer as shown in the right hand view of Fig. 5.

Retaining balls 22 are mounted within seats 23 through the wall of the tubular extension portion 19 of the valve body. These balls are of such a diameter as to insure that when in their outer positions they will lock against a tapered face 20 and when in their inner positions will move clear of the inner tubular face of the retainer 20, and will seat within an annular groove 24 formed around the circumference of a cylindrical portion 25 of a plunger 26. This plunger reciprocates within the tubular portion 19 of the valve body 14, and may move from its uppermost position shown in the lefthand view of Fig. 5, to its lowermost position as shown in the righthand view of Fig. 5. An enlarged head 27 is formed as a part of the plunger and occurs at the upper end thereof. Fluid circulating ducts 28 extend through the head and downwardly through the [fol. 122] cylindrical portion of the plunger where they communicate with a central passageway 29 within the valve body, and which passageway is in communication with lateral openings 30 extending outwardly from the valve body and into the bore 8 of the valve housing 7. The plunger is forced downwardly as shown in Exhibit C, by dropping go-

devil 31 upon it to move the recess 24 into register with the retaining balls 22 at which time the spring 17 will expand forcing the plunger and the valve body upwardly until the valve body is locked in its uppermost position by the spring collar 21 which has expanded at the end of the retainer 20.

The mandrel 11 extends downwardly within a packing box 32 which is formed with a central bore through it, the upper end of which is provided with a longitudinally extending keyway 33 to receive a key 34 carried by the mandrel 11. A tension nut 35 is threaded on to the upper end of the packing box and provides a lower bearing surface for a main valve spring 37 which is interposed between this nut and the lower face of the trip valve housing 7. A stuffing gland is formed at the lower end of the bore of the packing box to receive packing nut 39, and to make a tight joint for the packing material 38 around the mandrel 11. The packing box 32 carries a renewable valve seat 40 at its lower end against which a main valve 41 rests when in its closed position. This main valve is tubular, having an upper extension threaded into the lower end of the mandrel 11, and a lower extension receiving a safety circulating valve cage 42 which encloses a valve spring 43 and a circulating valve 44. A plurality of ducts 45 are formed through the upper extension of the main valve 41 above the valve shoulder, and establish communication with the central openings through the valve and the mandrel 11. Threaded on to the lower end of the packing box [fol. 123] 32 is a bottom collar structure 46 which has an upper tubular portion 47 forming a housing for the main valve and the circulating valve. The lower end of the bottom column 46 is threaded to receive a lower mandrel 48 which reciprocates within a sleeve 49. The upper end of the sleeve is counterbored to receive packing 50 held in position by a packing nut 51 which nut is formed at its upper end with an annular recess 52 and bypass ducts 53. Valve ports 54 are formed in the mandrel 48 and are brought to register with the annular recess 52 when the tool is removed whereby fluid pressure above and below the packer will be equalized. The lower end of the mandrel is formed with keys 55 sliding in keyways 56 in the sleeve 47, and by which rotation of the sleeve may be effected by rotation of the mandrel. A bottom sub 57 connects with the sleeve 49 and in turn may be connected with top collar

58 of the rat hole packer. This collar is tubular and is formed at its lower end with a central threaded opening to receive a packer mandrel 59 which extends downwardly through and serves as a mounting for a frusto-conical packing element 60. An upper plate 61 is disposed between the lower end of the top collar 58 and the packing element 60 and a bottom plate 62 is disposed between the lower end of the packing element and a bottom nut 63 by which the packing element is held in position upon the mandrel 59. The bottom nut 63 is counterbored at its upper end and threaded to receive the lower end of the mandrel 59 which lower end abuts against a shoulder 64 of the counterbore. A threaded opening 65 is formed through the bottom nut 63 and receives a perforated nipple 66.

The construction of the open hole packer shown in Fig. 4 will be evident without further explanation, since it is used in place of the rat hole packer shown in Fig. 3, and [fol. 124] only requires that an anchor string be attached to the lower collar to be extended to the bottom of the hole.

The construction of the hook wall packer shown in Fig. 2 of Exhibit B need not be described in further detail since this is not part of a formation testing tool, but a casing shoe tester, the construction and operation of the packing element being obvious.

In operation of the testing tool in making a formation test reference will be made solely to Exhibit C, using a rat hole packer. When the tool is lowered into the hole the parts are as shown in Fig. 1 of Exhibit C. Here it will be seen that the trip valve is in its closed and set position with the ball 13 held upon the seat 12. The main valve 41 is shown in the drawing as being in a closed position, and as being held in this position by the main valve spring 37. The position of the main valve, however, is immaterial since the trip valve will be maintained closed irrespective of any accidental jarring or resistance imposed upon the structure which might open the main valve. When the tool has reached the bottom of the hole the packer will be forced tightly into its seat and will shut off the fluid within the hole and below the packer from the fluid within the hole and above the packer. Fluid can, however, enter the perforated nipple 66 and flow upwardly through the mandrel 59 and the top collar 58 and then through the sub 57 and the mandrel 48 into the bottom collar 46 where it will be restrained from further upward flow by the main valve 41,

if this valve is closed. In any event, however, when weight is imposed upon the drill string and the upper portion of the tool, the drill pipe 5, coupling 6, the trip valve housing 7, and the mandrel 11 will be forced downwardly and will move the main valve 41 from its seat 40. Fluid may [fol. 125] then flow through the ducts 45 and into the mandrel 11 up to the valve ball 13. This is the limit of the upward movement of the fluid within the drill tool as permitted by the openings of the main valve 41. When an appropriate time has been reached to make the test and the packer has been firmly seated the go-devil 31 may be dropped down the drill string. This will open the trip valve since downward movement of the plunger will release the valve and cause it to move to an open position by action of the spring 17. Fluid may then flow upwardly within the drill stem to such a heighth as it would be carried by the fluid pressure in the formation. The trip valve will then remain open. When the drill stem is lifted it will draw the main valve 41 to a closed position and will then lift the packer from its seat, thus allowing the drill string and the tool to be withdrawn from the well with an entrapped sample.

It is often the practice when preparing the tool for insertion in the hole to fill the mandrel 11 and the passageway of the main valve 41 with liquid so that there will not be a severe impact within the tool when the main valve is opened. In making tests in deep wells it is the practice to place the trip valve structure at a point considerably above the remainder of the testing tool and within the drill string. The entire length of drill string below the trip valve and down to the main valve is then filled with liquid so that the liquid within the drill string will resist the collapsing pressure of the fluid within the hole, and this distance in some instances might be several thousand feet."

[fol. 126] (Plaintiffs' Exhibits 16-B, 16-C and 16-D (Exhibits "B," "C" and "D" to Defendants' Answers to Plaintiffs' Interrogatories), are reproduced in Book of Exhibits, pp. 225, 226, 227).

Q. Mr. Halliburton, are you familiar with these drawings and the written description of the defendants' tester?

A. Yes.

Q. Will you take the drawing of the defendants' tester and explain how the defendants' tester is constructed and operated?

A. Figure 1 of the drawing shows the testing apparatus with the main valve 41 and renewable seat 40. The device is so constructed that when Figure 3 is screwed onto Figure 1 you have the complete combination of the packer, that is, of the testing device, to test a well where there is a "rat-hole." When Figure 3 is screwed onto the lower end of Figure 1 and the packer is set in the top of the "rat-hole" a further lowering of the drill pipe causes the main valve 41 to disengage from a seat 40, opening the valve. When the pipe holding the testing device is lifted up the main valve 41 returns and engages the seat 40, closing the valve. In other words, the valve is operated by a movement of the pipe, move the pipe down to open the valve and move the pipe up to close the valve. In addition to the main valve an additional trip valve or plunger valve is shown at the top, which is opened by dropping an object into the pipe after the device is run in [fol. 127] the well. The apparatus will operate without the trip valve, and it is not really a part of the main testing apparatus, but is an accessory to the testing device.

Q. Where is this trip valve placed in the pipe? Does it have to be in any special place?

A. No. It is placed above the main valve, as far up the hole as you want to put it. Sometimes I understand they put it up 1500 or 2000 feet.

Q. What is it for, this trip valve?

A. It is to keep the fluid from coming up if the main valve should accidentally be opened while the device is being lowered into the well.

Q. Does it take the place of the main valve at all?

A. No. It serves an extra function. In other words, it is a safety device, and the main valve would secure a test without the use of this trip valve.

Q. In other words, it is an addition to the regular device; is that correct?

A. Yes.

Q. Are the same identical steps employed in operating the defendants' tester to take a test as are employed with the original Simmons' device?

A. Yes; the same steps of the method of the Simmons' device and of the apparatus involved in this suit.

Q. Is there any difference at all except the form of the movement of the device to open and close the valve?

A. The only difference is the shape of structure of the valve and in the difference in the movement of the pipe.

Q. But in both the valve is opened and closed by movement of the pipe?

A. Yes.

[fol. 128] Q. As you construe the teachings of this patent in suit is there any limitation to any particular form of movement of the pipe to open and close the valve?

A. No. Claim 18 covers any type of valve, regardless of how you might open and close it.

Q. And the other claims in the patent calling for a valve with the inlet positively controlled by movement of the pipe to open and close the inlet, does that include the kind of movement employed by the defendant, as well as that employed in the original plaintiffs' device?

A. Yes. The apparatus in the patent in suit rotates to open and close the valve, and in the Johnston device it follows a reciprocating movement to open and close.

Q. But both are movements of the pipe, as called for by the patent?

A. Yes.

Q. In the operation of defendants' tester to make a test is the defendants' tester lowered into the well on the end of a single string of pipe?

A. Yes.

Q. With the valve closed?

A. Yes.

Q. And carrying the packer?

A. Yes.

Q. And the packer is then seated at or above the point where the test is to be made?

A. Yes.

Q. And the valve is then opened by movement of the pipe?

A. Yes, to permit the fluid to enter the test string.

[fol. 129] Q. And the apparatus then stands for the period of the test with the valve open?

A. Yes.

Q. And then the valve is closed by movement of the pipe?

A. Yes.

Q. And then, on withdrawal of the pipe and the device, an entrapped sample recovered?

A. If one entered the chamber it is, yes.

Q. If there is any sample to trap you will trap it with that device; is that right?

A. Yes. I don't understand that you are compelled to get a sample, if it is not there.

Q. If there is any difference in the fundamental principles of this defendants' device and of the original Simmons invention as you obtained it?

A. There are no differences other than differences in form. The Johnston device can be and is operated in accordance with the teachings of the Simmons invention.

Q. In both cases, Mr. Halliburton, of the defendants' device and of the original Simmons device, the movements of the pipe that open and close the valve are manipulated from the derrick floor at the top of the well; is that correct?

A. Yes.

Cross-examination:

By Mr. Boyken:

Mr. Halliburton, I would like to trace the history of the original Simmons tool here that was offered in evidence as Plaintiffs' Exhibit No. 9. You say this was the tool that was shown to you by Mr. Simmons at a hotel in Arkansas in—What year was that?

A. In 1926.

[fol. 130] Q. Was it exhibited to you in 1926 just as it is here today, or has it been changed in some respects?

A. It had a perforated pipe on it.

Q. Would you mind stepping over here, and we will trace the history of this tool. Now, I understand it had a perforated pipe at the bottom end of the tool; is that correct?

A. Yes.

Q. Would you mind standing that up the way it is in a well hole?

A. It had perforated pipe screwed onto the collar below the packer.

Q. Can you stand this up? Now, that is the way it is in the well hole, the way you have it as present; isn't that so?

A. Yes.

Q. And the perforated pipe extends below the tool, the one that you say has been removed?

A. Yes.

Q. What about the rubber packer that appears on Exhibit 9? That is a different one, isn't it, than the one that Mr. Simmons originally had on there?

A. Yes.

Q. What became of the original one?

A. I don't know. I suppose we lost it in a well.

Q. And you subsequently put on the one that appears here?

A. Yes. I think we used several different packers with it.

[fol. 131] Q. You are referring now to the piece of rubber itself?

A. Just the rubber sleeve which is a part of the packer. The mandrel is also a part of the packer. I think the original mandrel is still present in the device.

Q. But the portion that is rubber in Exhibit No. 9 was renewed because the original one was lost in the well hole?

A. Yes. You will lose that rubber packer nearly every time you run it in a well.

The Court: When you speak of the mandrel, which is the mandrel?

A. The mandrel is that portion (indicating), the tubular piece that the packer slides over.

Mr. L. S. Lyon: You mean it is the metal portion that the rubber fits on?

A. Yes.

The Court: Is it the same shape as the rubber?

A. Well, it is just this threaded piece of pipe here, your Honor. You see, the rubber itself is only a part of the packing member. This shoe here forms a part of the packer itself, and this bottom shoe forms a part of the packer. The rubber is the packing element of the packer.

Q. That perforated end we have been talking about is similar to the perforated end shown in this model Plaintiffs' Exhibit No. 12, isn't it?

A. Yes.

Q. Or substantially like it?

A. Yes.

Q. You say that this rubber portion of the packer was lost in a well hole on the original tool, and subsequently a new rubber packer was placed on it?

A. Yes. We put a number of packers on it. We had considerable trouble with packers at first. Then we used can-
[fol. 132] vas and rubber instead of solid rubber. Mr. Sim-

mons had solid rubber, and solid rubber will seal, but when you pull it out you leave part of it in the hole, and then you have to get a new rubber.

Q. In any other respects is Exhibit No. 9 different from the original Simmons tool which you were shown, as you have testified?

A. Well, it has got some tool marks on it, and tongs, and so forth, showing considerable use since that time.

Q. But otherwise it is the same?

A. Substantially the same.

Q. I believe you said that was made in accordance with the drawing of the Simmons patent here in suit, but I notice there is a slight difference, and that is that the slot between the two portions of the valve is exposed in the patent drawing, while in Exhibit No. 9 that slot is not exposed.

A. No. It operates the same, though, as that in the patent. It doesn't change its operation.

Q. But in that respect Exhibit No. 9 is different from the patent in suit, that is, the drawing of the patent in suit, is it not?

A. Yes.

Q. You hadn't mentioned that before. Now, after you first saw this particular tool Exhibit 9 it was then used for practical testing purposes, was it not?

A. Yes.

Q. How many tests were actually made with Exhibit No. 9?

A. I actually saw one test made with it myself.

[fol. 133] Q. And when was that test made?

A. I have a report on the first test that was made. That was made on March 17, 1926. And the test that I saw made was two or three days or three or four days after the test that was made on March 17, 1926.

Q. Was that that packer—what was that name?

Mr. L. S. Lyon: Pace.

By Mr. Boyken:

Q. Was that that Pace test that you spoke about in your direct testimony?

A. Yes.

Q. So that you actually saw Exhibit No. 9 once actually making a test?

A. Yes.

Q. How many other times, to your knowledge, was Exhibit No. 9 used in making tests?

A. I think it was used on about 10 or 12 tests. Mr. Stoddard was in charge of it, introducing it in the field. John T. Simmons was with him, and they made two or three tests, and after Mr. Simmons left I think Mr. Stoddard continued to operate it in the field until we constructed the stop cock type device, of which I think the first one was turned out some time in June.

Q. I want to confine myself to Exhibit No. 9. You say there were 10 or 12 tests made with this exhibit?

A. Yes. I think that is about how many were made.

Q. And they were all made in the year 1926?

A. Yes.

Q. Where?

A. The first test was made on March 17th, and it was made—I don't think it was used after the other device was completed—I think some time in June, about June 15th. It might have been a little later than that.

[fol. 134] Q. So that the last time Exhibit No. 9 was used was about June, 1926?

A. Yes.

Q. What was done with it after that last test in June, 1926?

A. I had it stored in the vault in Duncan, and then we used it in the interference proceedings.

Mr. L. S. Lyon: And exhibited it at the Patent Office?

A. And exhibited it in the Patent Office. And then we used it in Sherman, in the case of Halliburton vs. Johnston Formation Testing Corporation, and now we have it here. It has been about the country.

By Mr. Boyken:

Q. When you say you used it, you mean that you used it as an exhibit merely, and not actually for making a test; is that right?

A. Yes.

Q. But it wasn't actually used for making a test since June, 1926?

A. No. But you can take it and make a test with it right now.

Q. Well, I haven't asked you that, Mr. Halliburton. Now, you subsequently, then, abandoned the use of this? Or, let

me go back. These 10 or 12 tests that were made with Exhibit No. 9, were they paid for?

A. No, they were not paid for.

Q. So that Exhibit No. 9 never was used commercially; is that correct?

A. No, it never was—well, I wouldn't say it wasn't used commercially. Just making tests, creating good will, would be commercial tests. I would say that they were commercial tests, but we didn't collect any money for them.

[fol. 135] Q. How much do you now collect for a test, under your present apparatus?

A. We charge $200 rental for making a test.

Q. But in the case of Exhibit No. 9 no charge was made?

A. No.

Q. What did you do after June, 1926?

A. We started in to develop improvements of the Simmons invention, and are still trying to develop improvements of it.

Q. Now, the next form of tester that was devised by you was the stop cock and gear form; is that correct?

A. That is the next that we manufactured.

Q. Is that in evidence in this case?

A. Yes.

Q. As Plaintiffs' Exhibit No. 12?

A. Yes.

Q. And that is the model that I now hold in my hand?

A. Yes.

Q. And Exhibit No. 13 in this case shows the interior construction of your stop cock and gear tester?

A. Yes.

Q. Did you file a patent application for the stop cock and gear tester?

A. Yes.

Q. Whose application was it?

A. My application.

Q. Do you recall when that application was filed?

A. Yes.

Mr. L. S. Lyon: I think you have a copy of it, so if you will produce it it will save time.

[fol. 136] Mr. Boyken: Very well. I have a certified copy of the abandoned application of Erle P. Halliburton, filed December 28, 1926, Serial No. 157573, entitled "Improve-

ment in Well Testing Device." Is that the application for patent filed by you?

A. Yes.

Mr. Boyken: We offer the certified copy of the abandoned application in evidence, and ask that it be marked Defendants' Exhibit A.

Mr. L. S. Lyon: Just a minute. You are offering all the papers that are under this seal that you have here in evidence?

Mr. Boyken: We are offering the entire application file, with the application itself, the Patent Office actions and amendments, down to the time of abandonment, the file wrapper and contents of the abandoned application.

Mr. L. S. Lyon: I would like to reserve the objection that it is immaterial, but I suppose that can be argued, if necessary, when the case is argued.

The Court: It is an application, and the file shows the subsequent action of the Patent Office upon it?

A. Yes, your Honor.

Mr. Boyken: There are several other actions in there in the interval, and then its final abandonment.

The Court: The witness was a party to all of those proceedings?

Mr. L. S. Lyon: Yes, your Honor.

Mr. Boyken: Yes, your Honor. He filed the application himself.

[fol. 137] The Court: Let it be admitted.

The Clerk: Defendants' Exhibit A.

(Book of Exhibits, p. 236.)

By Mr. Boyken:

Q. Now I call your attention to the usual oath at the end of an application, which I am going to read.

Mr. L. S. Lyon: I don't think that is a part of your cross-examination. It doesn't impeach anything he said here. It is not material to anything he testified to on direct examination, what the terms of that oath are.

Mr. Boyken: If your Honor please, I would like to finish my question.

The Court: Objection overruled.

By Mr. Boyken:

Q. It is a portion of Defendants' Exhibit A, just admitted in evidence. It reads:

"State of California,
"County of Los Angeles, ss:

"Erle P. Halliburton, the above named petitioner, being duly sworn, deposes and says that he is a citizen of the United States, and resident of Los Angeles, California; that he verily believes himself to be the original, first and sole inventor or discoverer of the Well Testing Device, described and claimed in the annexed specifications;" et cetera.

I am going to ask you if you executed that oath?

A. Yes.

[fol. 138] Q. And that became part of your patent application for the stop cock and gear device?

A. Yes.

Q. During the prosecution of that application—and I am now referring you to an amendment and argument filed by your then attorneys and your present attorneys in this case, under date of April 11, 1931, wherein you speak of the stop cock and gear device, and in this amendment the language is as follows.

Mr. L. S. Lyon: I object to this argument. This is not cross-examination of this witness at all.

Mr. Boyken: This is not argument.

The Court: This is some statement of the witness?

Mr. Boyken: This is a statement by the witness' attorney, who had a power of attorney in that case. I want to remind your Honor that Mr. Halliburton is an expert in this case and says that he is very familiar with patent matters.

Mr. L. S. Lyon: This document speaks for itself. Whatever statements were made in the Patent Office, the document shows for itself, and it does not have to be read.

The Court: I think the witness may be cross-examined with reference to any proceeding to which he was a party.

The Witness: I would like to ask, Mr. Abbett, if that statement was filed before or after the oath.

Mr. Boyken: You may take it and look at it yourself. But, answering that question directly, it was filed considerably after. You may look at it.

Mr. L. S. Lyon: I don't think this is material cross-examination. What argument may have been offered in [fol. 139] the Patent Office was done in an endeavor to get them to act favorably on that application.

The Court: Well, this refers to the stop cock device, what you refer to as the second device?

A. Yes, your Honor.

The Court: Wait a moment, sir. The testimony is that he applied for a patent. He explained that in his direct examination, explained it as an improvement on the original device that was not, in and of itself, necessarily subject to a patent, as I recall his testimony, but the basis being the original device. Now, apparently he made an application for a patent, and he is being cross-examined relative to those proceedings. It seems to me that is all a proper subject of cross-examination. Go ahead.

By Mr. Boyken:

Q. In that application there is a reference made to the previous Simmons patent, and I am now quoting from the action that I referred to before: "This device"—and you are referring to the Simmons patent—you recall that, do you not?

A. Yes.

Q. "This device in operation, while it worked successfully, had the disadvantage that the ground fit between parts 14 and 19 would stick, requiring careful manipulation of the pipe to take some of the weight of the pipe off the part 4."

That was a criticism of the device shown here in Exhibit No. 9, was it not?

A. Well, I would say that certainly an anti-friction bearing in a device will operate easier than a device that doesn't have one. That was the object of designing this device, so as to get away from the friction that is inherent in the original device. The original device is a commercial device [fol. 140] and will operate commercially, but certainly one would have a right to improve any apparatus that he had by adding a bearing.

The Court: Well, that doesn't exactly reach the question. The question is, was it not a criticism of the original device.

In other words, I understand that to mean, does it not point out some objection to the original device.

A. Yes, your Honor.

By Mr. Boyken:

Q. Now, this says that the fit between parts 14 and 19 would stick. Referring now to Exhibit No. 9, will you point out those two parts that would stick?

A. Well, the upper and lower body parts.

Q. Just put your hands on them so that we can see them.

(Witness did as requested.)

Q. You mean the two portions of the valve that rotate one with respect to the other, they would stick?

A. Yes.

Q. Just why would they stick in Exhibit No. 9?

A. Well, because of the large surface space, the friction of it. I wouldn't say it would stick always. Certainly it operates and did operate as a commercial device, but——

Q. I am asking you why they stick.

A. Why will any two flat surfaces that are ground together stick? Certainly it will stick, and so in that paper we were trying to point out to the Patent Office that the anti-friction bearing had an advantage over a flat surface. Now, the Patent Office denied the patent, claiming that just inserting an anti-friction bearing was not invention.

[fol. 141] Mr. Boyken: Your Honor, I move to strike out that answer

The Witness: I think that is in the record there.

The Court: Well, yes, the latter portion of it should go out. The question was, why did they stick. But he has already claimed that most surfaces or many surfaces do stick. They stick, I suppose, because of friction between the two. To that extent the question is answered. The latter portion of the answer is not responsive and should go out. Motion granted.

By Mr. Boyken:

Q. Couldn't the two portions of the valve be loosened so that they wouldn't stick?

A. Well, they could be loosened so they wouldn't stick. You could loosen it to where you could lift the upper por-

tion off of the lower portion. It had to be tight enough, with an oil with viscosity that it would stay in there and wouldn't squeeze out, so that it wouldn't leak, and yet loose enough so that it would operate.

Q. Suppose the two valve portions in Exhibit No. 9 did stick, could you make a successful test of the well?

A. On the well in which I saw the test it didn't stick. We would tighten it up on the derrick floor and adjust those nuts, and we would get them too tight, and it would stick, and we would have to loosen them up, and it would take considerable time to adjust those nuts to the proper tension so that it wouldn't leak, and at the same time so that it could be operated to open and close the valve.

Q. If the two portions of the valve in Exhibit 9 were too close together they would stick; isn't that right?

A. Well, you could clamp it down with those nuts to a point where you couldn't turn it unless you had oil in it.

[fol. 142] Q. And then if they were far enough apart there was a liability of the valve leaking, wasn't there?

A. Yes. But the adjusting nuts made it possible, by exercising the proper care, to adjust it so that it wouldn't leak, and at the same time so that it could be turned, but naturally it would turn harder, due to sticking, than the stop cock device that has an anti-friction bearing in it.

Q. Let me read you the next paragraph in the file wrapper and contents of this abandoned application, Defendants' Exhibit No. A, which is as follows:

"After operating in the early part of 1926 with the Simmons form of tester, the invention of this application was devised in which the ball race 27 is supplied with a plug cock valve 6."

Now, that refers to the portion in Plaintiffs' Exhibit No. 12 which you called—what did you call it in your testimony—the ball bearing feature?

A. Yes.

Q. Now I am going to continue: "These parts were all provided in the apparatus in such a manner as to be protected from fluid in the well." What was meant by that, Mr. Halliburton?

A. I mean that the ball bearing and the stop cock was within a casing, packed off in such a manner that the mud fluid did not come in contact with those working parts.

Q. And what about Exhibit No. 9?

A. It has no ball bearings or stop cock to come in contact with the mud fluid.

[fol. 143] Q. And the mud fluid would be liable to get into the space between the two portions of the valve in Exhibit No. 9?

A. No, it wouldn't be liable to do that if it was properly adjusted.

Q. That is, if it was tight?

A. If it wasn't too tight.

Q. Let me continue, then: "It should be appreciated that inside of the pipe 2 of the Halliburton apparatus there is no liquid when the device is being lowered into the well, yet outside of the pipe and surrounding the parts housing the ball race and valve liquid pressures exist inasmuch as the device may be lowered 5,000 feet or more below the liquid level in the well. The design and arrangement of a valve and bearing, therefore, which could operate satisfactorily under these severe conditions was a matter requiring a large amount of study and experimentation." What did you mean by that, Mr. Halliburton?

A. Well, I mean that in order to design a device and get a ball bearing in it, that I had to design this apparatus. The Patent Office had granted some 30 or 40 patents on valve structures for testing devices, and I don't think any of them shows much more invention than this, but they denied me a patent.

Q. Let me ask you if it required a great deal of study and experimentation to get up a device such as shown in Plaintiffs' Exhibit No. 12?

A. Well, I began thinking about improvements of the Simmons device immediately after I acquired it, and this was the first development until some time in June, before this device was developed. In the meantime we had been using the Simmons device. I worked and thought about [fol. 144] six or seven years of a new type tester before I brought out the "J" type tester.

Q. At the time of adjournment last evening we were considering the application for patent which was filed by you on the so-called stop cock and gear tool, and I was reading portions from the file wrapper and contents of that patent. I want to read one more portion and ask you to explain it. Have you had an opportunity to examine this file wrapper and contents since I cross-examined you yesterday on it?

A. Yes.

Q. I want to call your attention to an argument which appears in Defendants' Exhibit A, dated April 11, 1931, and signed by Lyon & Lyon, your attorneys. Reading from page 9 of that argument, it is as follows——

Mr. L. S. Lyon: If your Honor please, I would like to reserve an objection to this line of examination on the ground that it is incompetent, irrelevant and immaterial. I think the rule is well settled that, while the file wrapper of a patent in suit may be referred to and statements made therein presented, the rule does not extent to a different application. I had a citation here this morning, which I will check again and present to your Honor in a few minutes. Well, I have it here. It says, "While admissions made in the prosecution of the application in the Patent Office may be introduced against the patentee, statements made by him in prosecuting applications for patents other than the one in suit are not admissible." That was held in the case of General Electric Company vs. Mallory, 298 Fed. 579, affirmed in 294 Fed. 562 at page 567, and certiorari denied in 266 U. S. 609. I am reading from 48 Corpus Juris, page 355.

[fol. 145] Mr. Boyken: I am not familiar with that authority, your Honor, but Mr. Halliburton is presented here as an expert. Not only that but this particular application is his own application and his contention, as I understand it, is that the thing that is covered by this application is the same as the Simmons device. In other words, there has been no departure from the original Simmons disclosure except perhaps in some slight degree of improvement. I don't think that there is any case that would decide that I am not permitted to cross-examine Mr. Halliburton both because he is the plaintiff and an expert of the file wrapper and contents of his own patent.

The Court: Give me the citation again, Mr. Lyon, will you?

Mr. L. S. Lyon: The case cited in Corpus Juris is 298 Fed. 579 and that was affirmed in 294 Fed. 562.

The Court: There must be some confusion. You say 298 Fed. is the first one?

Mr. L. S. Lyon: That is the Circuit Court of Appeals decision, affirming 294 Fed. 562. The latter case is the lower court. The appellate court decision is 298 Fed. 579.

The Court: I see. Without, of course, going into the effect of those decisions, I would think that statements made by a witness at any time that bear upon his statements upon the witness stand are proper subjects of cross-examination, no matter in what connection, whether made in connection with an application for a patent or otherwise. And especially that would apply to an expert.

Mr. L. S. Lyon: I take it this is not a statement made by this witness but is a statement they tried to impute to him because it was made by his attorneys in the course of an [fol. 146] argument in presenting his application to the Patent Office. If it was his own statement, of course, the rule would be as your Honor says, but for the purpose of impeaching or contradicting his testimony as a witness in this case I don't think the rule warrants extending it to statements made by his attorneys in trying to argue to the Patent Office in an application that is not involved here.

The Court: No. But, if it were made by his attorneys, he would be presumed to have adopted that, would he not?

Mr. L. S. Lyon: If that application was the one that was in suit here, yes. But you can't make that presumption in a collateral way where that application is not involved here and impute it to him as a basis for cross-examining or contradicting his sworn testimony here.

The Court: It may be a little bit remote. Other than that, though, I rather think it is admissible. At any rate, I will admit it and in the meantime I will examine those cases.

Mr. L. S. Lyon: May we have the objection stand, without repetition, to this line of testimony and an exception noted?

The Court: Yes. Such testimony will be deemed objected to and the objection overruled and an exception noted to it.

By Mr. Boyken:

Q. The statement is as follows: "The Simmons application fails to disclose how a valve may be protected from fluid pressure in a well testing device." In what way, Mr. Halliburton, does the Simmons device, which we examined yesterday and which is in evidence as Plaintiffs' Exhibit No. 9, fail to have the valve protected from the fluid pressure in testing a well?

[fol. 147] A. Well, the differences in the construction of the Simmons device and the valve in the stop cock device are such that in the stop cock device the valve can be en-

cased and is encased, whereas with the Simmons device it is not necessary to encase the valve, since the body part of the valve itself is a moving part but is not affected by any fluid. The working parts of the valve are protected from the fluid by the very nature of the construction of the device of the Simmons invention.

Q. Well, you haven't quite answered the question. I want to know, in the Simmons device, whether or not the valve is protected from the fluid pressure in the well.

A. What portion of the valve are you speaking of?

Q. The operating valve portion in the Simmons device, Plaintiffs' Exhibit 9.

A. Which operative portion? You have two movable parts, of which there must fluid come in contact with the exterior of the valve, while you have those parts abutting by means of the ground joint, and which the fluid cannot come in contact with the working parts that open and close the ports, that is, that portion of it that is movable adjacent to the ports.

The Court: Let me interrupt.

Mr. Boyken: Yes, your Honor.

The Court: I think it is advisable for all counsel to understand just how much of the proposition the Court understands. Therefore I feel free to suggest from time to time my own ideas of the device. I understand the pattent and the drawing far better than I do the device that has been shown here. But here is a part inserted that comes in contact with the surface to be tested, and, necessarily, with the contents of the "rat-hole" tool with the little holes in it [fol. 148] that is effectually sealed off from the collar, from the mud above. That hole extends up through the solid steel material that it is made of, and by a manipulation of the other piece that slides upon this part with the hole in it the hole is made continuous; in other words, the hole in the upper piece comes in alignment with the hole in the lower piece, and therefore there is free access from the portion of the space to be tested with the theretofore empty space in the drill pipe.

The Witness: Yes, your Honor.

The Court: Do I make myself clear?

The Witness: Yes, your Honor.

The Court: All right. Now, it is very evident, of course, that that is a very simple and, so far as I can see, a very

effectual way to get the sample of what is in the "rat-hole" up into the drill pipe, with nothing else mixed in with it except whatever comes from the stratum to be tested. Now, that is the valve, is it?

The Witness: Yes, your Honor.

The Court: Just that hole from the lower part continuing up to the upper part?

The Witness: Yes, your Honor.

The Court: That is what you call the valve?

The Witness: Yes, your Honor.

The Court: Now, that is quite simple. It is turned over by an operation on the surface of the ground, and as soon as the hole in the one part coincides with that in the other there is an open avenue or an open conduit where the flow can go?

The Witness: Yes, your Honor.

The Court: Well, that I can understand quite distinctly. I am not prepared to say that it is as clear in the instru- [fol. 149] ment itself—that, of course, is accounted for by the fact that I can't see through the iron—as it is in the diagram in the patent itself.

The Witness: Your Honor, you see, the difference, in the stop cock device you have a ball bearing in there, and you want to keep the mud out in connection with that valve, and you have a gear to operate the valve, and so in this application it provided for means to exclude that mud fluid from the working parts.

The Court: I don't care to go into that for the present. I will gather the information as we go along. But the gear was designed to be an improvement on the valve function?

The Witness: Yes, your Honor.

The Court: The functioning, rather, of the valve?

The Witness: Yes, your Honor.

The Court: All right.

By Mr. Boyken:

Q. Then I take it that the Simmons application for patent, and also the Simmons tool as it has been demonstrated here, does not disclose how a valve may be protected from the fluid pressure in a well-testing device; that is correct?

A. It does not disclose how you can protect ball bearings and a gear from the mud fluid, because it does not disclose a ball bearing or a gear.

Q. I am asking you, Mr. Halliburton, if that is correct or not, my statement.

A. Yes, it is correct.

The Court: Well, now, you will have to do some explaining there. I understand that the valve, if the valve consists, which it does, of a hole in the upper piece, when placed in alignment with the hole in the lower piece, is protected by [fol. 150] reason of the fact that the fluid—and by the fluid I think you are referring to the column of mud in the well—is protected by reason of the fact that the drill pipe encloses the upper portion of the valve, and therefore it is impossible for the mud to get into the valve; isn't that correct?

Mr. Boyken: I don't think that is quite correct, your Honor.

The Court: Then you will have to do a lot of explaining before I can understand the force of that question, and you had better get at it, with the device itself. Read that question again, Mr. Reporter.

(Question re-read by the reporter.)

Mr. Boyken: It is really based upon the statements in this file wrapper, statements that Mr. Halliburton's attorney made when he was prosecuting an action for the stop cock and gear device.

The Court: I understand that. Now, referring to patent No. 1,930,987, and to Figure 1, 23 is the drill pipe?

Mr. Boyken: Yes, your Honor.

The Court: The end of the drill pipe?

Mr. Boyken: Yes, your Honor.

The Court: And inside 23 there is nothing but air; is that right?

Mr. Boyken: Yes, your Honor; at certain stages that is all there is there.

The Court: I am speaking now of the time before the valve is put in operative position.

Mr. Boyken: Yes, your Honor.

The Court: Surrounding 23 is the mud or the fluid; is that not correct? How about that?

[fol. 151] Mr. Boyken: Well, the entire device there is inserted in a casing. There is a casing, not shown in this patent drawing, which surrounds the entire device when it is down in the well, and then when you get beyond the casing of course you have the walls of the formation.

The Court: Well, but inside of the casing that you are speaking of, that is not shown, is the mud, is it not?

Mr. Boyken: Yes.

The Court: And immediately in contact with the surface of 23?

Mr. Boyken: Yes.

The Court: Now, it seems to me, if I understand this proposition at all, that the proper answer to that question would be that the valve is protected from the—shall we call that the mud-laden fluid? When you say "fluid" you mean the mud-laden fluid?

The Witness: Yes, your Honor.

Mr. Boyken: Yes.

The Court: It is protected from the mud-laden fluid by the walls 23. 23 marks the walls of it.

Mr. Boyken: But the valve, your Honor, is below 23. If you will follow down on Figure 1 at the point marked 24 and 25, these are the valve breaks. That is where the two portions of the valve are. Those are the two parts that stick.

The Court: Do you mean that at 24 and 25 is where the two parts of the valve come in contact with each other?

Mr. Boyken: Yes, your Honor. At that point the two portions of the valve are either aligned so that there is a continuous channel or they are rotated part way so that that continuous channel is broken. And that is the point where [fol. 152] the valve is, that is, that the two portions of the valve meet.

The Court: Then, when you speak of preventing the fluid from coming into the valve or protecting the valve from this fluid, you mean down at that point?

Mr. Boyken: Yes. There is fluid that surrounds that point.

The Court: That is the point where the two openings come into alignment rather than down at 16?

Mr. Boyken: Yes. They come into alignment or go out of alignment at that midway point which is marked 24 in the patent drawing, and that is the point we are talking about.

The Court: But the portion above 24 revolves partially upon the portion below 24?

Mr. Boyken: That is the breaking point at 24. That is the point we are talking about and there is this fluid pressure at that point.

The Court: The fluid immediately surrounds 24, does it not, and the similar part above is numbered 19, is it not?

The Witness: 19, I believe.

Mr. Boyken: There is a packer below. If you will follow down a little lower on that same Figure, you will notice the packer at the point marked 16, where the packer commences, and that is where the two parts of the well, if we can call it such, are packed off one from the other. They are separated.

The Court: I am not clear on what you are saying.

The Witness: Your Honor, 24——

The Court: Wait just a minute.

[fol. 153] Mr. Boyken: May I clear that up for your Honor?

The Court: Yes.

Mr. Boyken: Going down a little further, with my pencil now at the point marked 16, which is the top of the packer, and then following down to the bottom of the packer, that corresponds to the rubber portion that is on Plaintiffs' Exhibit No. 9. That separates the two portions of the well so that the portion below that packer may be tested. The valve structure, however, is above the packer and it is at that point that I have indicated as marked 24 in Figure 1. The valve is at 24. And that is subject to the pressure which is above the packer.

The Court: That is plain.

Mr. Boyken: Then, in making the test, when the well is packed off, the valve is opened by rotating the upper portion of the valve structure and the break is there at 24. That opens the ports and the fluid to be tested flows upwardly through those ports because the ports are in alignment at 24.

The Court: Yes.

Mr. Boyken: Now, the point I am getting at is that 24, which is the break of the valve, is exposed to the pressure that is in the well hole above the packer.

The Court: Yes.

Mr. Boyken: To make that clear, I would like to read the entire statement again from the point I first commenced. This is a criticism of the Simmons device in Mr. Halliburton's later application. "The Simmons application fails to disclose how a valve may be protected from the fluid pressure in a well testing device. It provides a device which has the disadvantage that it will stick in operation. It

[fol. 154] clearly is not an anticipation of the improvements in the specific claims of this application."

Q. Now, I am asking you, Mr. Halliburton, is that statement correct? Is that a correct criticism of the Simmons device?

Mr. L. S. Lyon: I object to that statement. It does not purport to be a criticism of the Simmons device. It purports to show that one is an improvement over the other and that does not involve the word "criticism" at all. It involves the word "difference."

The Court: The objection is overruled.

A. In that paper before the Patent Office——

By Mr. Boyken:

Q. May I have an answer to my question?

The Court: Yes. Answer the question.

A. It is not a criticism of the Simmons device.

By Mr. Boyken:

Q. Then, is it a correct statement?

A. Yes; it is a correct statement.

Q. Tell us why.

The Court: Let me make another statement here. It is probably due to a lack of understanding in the mind of the Court but it seems to me that the vital principle of this patent is the ability to test what comes into the "rat-hole" without removing the column of the fluid and without doing the various other things involved, changing the casing, and so forth. That, as I understand it at present, is the purpose, object, or whatever you might call it, or the invention, in other words; that that is the invention. Hitherto they were not able to do this except at a considerable expense, according to what the plaintiff has said, and now, by reason of that rubber portion, they are able to stop the entrance [fol. 155] of the fluid beyond that point to relieve the lower point of the pressure of the column of fluid, and by reason of this arrangement of valves to make a test. In other words, the patent is not of the valve but of that device which accomplishes that purpose I have described.

Mr. Boyken: That seems to be the impression that the witness has given us so far.

The Court: Yes.

Q. In order to make clear this matter of the valve sticking, which we went over last night, just how does the valve stick, that is, the two portions of the valve as shown in the Simmons patent, where they meet at the point marked 24? How do they stick?

A. I have never seen it stick but I can readily see that, if you tightened the adjusting nuts too tight, it would stick, the same as if you tightened the adjusting nuts on a stop cock and gear device too tight, that the core of the stop cock would stick. And the moving parts that cut off the fluid and permit the fluid to pass are subject to exactly the same pressure as the parts in the Simmons device. But in the stop cock device provision is made so that the mud fluid does not come in contact with the gears or the balls. But so far as the pressure of the mud fluid coming in contact with the core of the stop cock, which is the moving part that opens and closes there, it comes in contact with that to exactly the same extent that it does with the Simmons device. Of course, both devices necessarily have to come in contact with the mud fluid when they are running the well. In other words, the mud fluid is permitted to come against the core of the stop cock in the Halliburton stop cock and gear device, and the mud fluid is permitted to come in [fol. 156] contact with the face of the ground joint, which is equivalent to the ground core of the stop cock device in the Simmons device. So the mud fluid must necessarily come in contact with those ground joints and they have to be ground and fitted so that the mud fluid cannot enter. That is true of the Simmons type of valve and it is true of any stop cock valve.

Q. Did the mud fluid enter in the Simmons device when it was in operation?

A. To my knowledge it never did.

Q. If it did enter, would that be a disadvantage?

A. Well, if it entered to an excess, if it leaked to a point where it would destroy the test, yes, it would be a disadvantage. But, certainly, that is common to any valve and when it is properly adjusted it doesn't leak and when it is properly ground. All valves are ground so that they don't leak, that is, when they are properly ground, but when they leak it is due not necessarily to the design of the valve but to lack of care in adjusting it and in grinding it.

Q. Can you grind and fit the valve in the Simmons structure so that it will operate and still will not leak?

A. Yes.

By the Court:

Q. When you say grind the valve, Mr. Halliburton, what do you mean?

A. You grind those two surfaces that exclude the fluid so that they fit so closely that a fluid cannot move in between those fitted parts.

By Mr. Boyken:

Q. It sticks, then, if the two moving portions of the valve are tight, is that correct?

A. If it is clamped up tight enough. It all depends on how tight. Tightness can be measured in degree.

[fol. 157] Q. And, if it is loosened, it will leak?

A. Yes. But it all depends on what you mean by "loosened." That is also by degree. If you clamp the nuts down so tight you couldn't move it, it would be too tight; and, if you loosen them and leave them so loose that there would be a sufficient space to permit the fluid to pass in through there, then they would be too loose. So it is just a question of adjusting those nuts the same as you adjust the nuts on any stop cock and drawing the core into a point where it does not leak.

Q. What is meant by this statement, "It provides a device which has the disadvantage that it will stick in operation"? Is that what you have just explained?

A. Well, certainly, what was intended to be expressed there was you have to rotate it and, if you have ball bearings to carry the weight of the drill pipe, it is easier to rotate than if you do not have. That is what was intended by that statement there.

Q. I have just one more sentence to read. Your attorney says with respect to the Simmons device, "It clearly is not an anticipation of the improvements in the specific claims of this application." What is intended by that?

A. In that application the claims were drawn narrow for the use of an anti-friction bearing with a stop cock operating a gear and eliminating those elements, that is, adding elements that are not shown in the Simmons patent. The Patent Office, however, finally rejected a patent on that application, citing the British issued Simmons patent.

[fol. 158] Q. You need not go into that unless you feel it necessary to answer my question.

A. I think the entire file wrapper will explain everything without just reading a few lines from it.

Q. The result is that you didn't get a patent, isn't that correct?

A. Yes. It was rejected on the Simmons British patent.

Q. Do you still feel that you should have gotten a patent?

Mr. L. S. Lyon: I object to that on the ground that it is not cross-examination.

Mr. Boyken: I will withdraw the question and put it in this way.

Q. Is it your opinion that this application discloses novelty over the Simmons patent?

Mr. L. S. Lyon: I object to that as immaterial in this case.

The Court: That might be material where the plaintiff is produced as an expert.

A. That application is as different from the Simmons application——

By Mr. Boyken:

Q. Can you say yes or no and then make your explanation?

A. Yes.

Q. Do you still think so?

A. It is different from the Simmons application and is as much different from the Simmons application as the Johnston patent is from the Simmons application or from 50 other patents that have been issued on testing devices since the Simmons application was filed in the Patent Office.

[fol. 159] "Mr. Boyken: Mr. Reporter, will you be good enough to read that question again?

(Question read by reporter.)

By Mr. Boyken:

Q. What is the answer?

Mr. L. S. Lyon: The answer was yes, with that explanation."

Q. I understand on your examination that you made some 10 or 12 tests with the Simmons tool, Plaintiffs' Exhibit No. 9, and that they were all successful. Is that a correct statement?

A. I stated that I only saw one test myself; that there were some 10 or 12 tests made, under the direction of Mr. Stoddard, by Mr. Simmons, who is here in the courtroom, and others who worked with Mr. Stoddard. I know that I have a written report here, that was dictated in my presence, in which——

The Court: One moment, Mr. Halliburton. That is hardly an answer to the question. The question was did you see the tests made.

By Mr. Boyken:

Q. How many of those tests did you see yourself?

A. I saw one.

Q. And there were 10 or 12 altogether but the others you did not see?

A. No.

Q. Were these tests all successful or were some of them unsuccessful?

A. I only saw one of them.

Q. And that is the only one you can testify to today?

Mr. L. S. Lyon: If you want to ask him, he can tell you what was reported to him. I haven't any objection to Mr. [fol. 160] Boyken asking Mr. Halliburton what the reports were to him as to whether the tests were successful or not. The tests were being run by men in his organization. He was the president of the company and they reported to him whether they were successful or not. Now, if Mr. Boyken wants to ask him what the reports were, it is quite all right with me.

The Court: He is being asked if they were successful.

Mr. L. S. Lyon: Yes.

The Court: And he should answer that in whatever way he sees fit. If he did not personally know, he could, then, recite from the reports, I would think. Just let us have your knowledge on it. Were they successful or what do you know about these tests other than the one you have just mentioned?

A. They were reported as being very successful; and Mr. Stoddard and those interested in it were very enthusiastic about the success of the tool.

By Mr. Boyken:

Q. Do you remember a suit that was filed against you for $12,000 because of the operation of the Simmons tool at that time?

A. I have been sued a lot of times. What is the style of the case?

Q. Do you remember a suit that was filed against you by reason of the use of this particular Simmons device, Exhibit No. 9?

A. No, sir.

Mr. L. S. Lyon: I think the suit should be identified if there is such a suit.

The Court: The question has been asked and answered.

[fol. 161] By Mr. Boyken:

Q. What is the answer?

A. The answer is that I have never been sued for the use of that tool on any well.

Q. That tool was used on the Pace well, was it not?

A. We have tested lots of wells for Mr. Pace.

Q. Was Exhibit No. 9 used on one of those tests for Mr. Pace?

A. Yes; it was used on several wells for Mr. Pace.

Q. The answer is yes, then, is it?

A. Yes.

Q. Did Mr. Pace sue you at any time by reason of the use of that tool on his well?

A. I have replied that I have never been sued by Mr. Pace or anyone else for any damage resulting from any——

The Court: No, that isn't the subject at all. Do you remember having been sued by Mr. Pace for the use of this instrument? I believe you said you did not. Is that correct?

A. Yes, your Honor.

The Court: Very well. That is enough.

By Mr. Boyken:

Q. Were you ever sued by anyone for the use of Plaintiffs' Exhibit No. 9.

A. No.

Mr. L. S. Lyon: That has already been asked and answered, your Honor.

The Court: Well, he has answered it just now. He said no. I do not attach a great deal of importance to the fact that somebody brought a suit. That wouldn't mean very much to the Court.

Mr. L. S. Lyon: I don't think anybody did on this Exhibit 9. I never was so informed.

[fol. 162] The Court: Well, that is the witness' opinion. That is his statement. Now, it is for the other side to show something different.

Mr. Boyken: If your Honor does not attach very much importance to it we won't go into it any further. But there was testimony in the Texas suit with respect to it, and that caused the inquiry here.

The Court: I say I do not attach much importance to it, because that is a thing that might happen through misunderstanding or for many reasons. What we are concerned with is the success of the invention, not its failure, I suppose. The fact that somebody thought it was a failure, wouldn't mean very much.

By Mr. Boyken:

Q. Then let me ask you, Mr. Halliburton, after these nine tests or ten or twelve tests were made the tool was put away, wasn't it?

A. Yes.

Q. Did you ever make any other tools in accordance with the drawings of the Simmons patent?

A. Yes.

Q. Which tools were those?

A. We made one other tool. I don't think the tool was ever used.

Q. One other tool?

A. Yes. I think it is still in the warehouse. We only made it about a year ago.

Q. Why didn't you continue to use Plaintiffs' Exhibit No. 9 and this other tool that you speak of?

A. Well, we thought that the stop cock device, that in that we had a better valve than the Simmons device, and it made operation easier.

[fol. 163] Q. It wouldn't stick?

A. Unless it was handled with proper care it would.

Q. So you abandoned the use of the form shown in the Simmons patent for that reason?

A. We did not use it after we put the stop cock type device in the field. From then on we manufactured only stop cock devices, with the exception of a few experimental tools that we made.

Q. What I am trying to find out is why you did not continue to use the device that is disclosed in the drawings of the Simmons patent?

Mr. L. S. Lyon: That has been already asked and answered, your Honor.

The Court: Yes; I think it has already been answered. He said he thought the other was a more successful device. Is that correct?

A. Yes, your Honor.

By Mr. Boyken:

Q. A more successful device because the valve did not stick?

A. Well, because we had a ball bearing in it that would carry the weight of the pipe, which made it easier to operate.

Q. And also for the reason that the valve would not stick?

A. Well, that is exactly what does stick the valve, is the weight of the pipe.

Q. So that by taking the weight of the pipe off the valve would not stick?

A. Well, you do not have to take all of the weight of the pipe off. You take only a portion of it off. You suspend a portion of the weight of the drill pipe and leave a certain portion of it unsuspended to press the packer [fol. 164] into the seat, and of course that is adjusted so that you can turn it.

The Court: The court's understanding of the position of the plaintiff is that the additional advantage aided by the stop cock arrangement did not go to the extent of being new invention, that it was rejected because the invention lies in the Simmons patent, and that the stop cock was clearly an improvement in the valve arrangement, which is merely an incident of the Simmons patent.

Mr. Boyken: So that you may know our position on that point, I will say that our position is that the Simmons patent is invalid because it shows an inoperative, impractical structure.

By Mr. Boyken:

Q. Now getting on to another subject, you said that some 7500 tests were made by the Erle P. Halliburton Company and the Halliburton Oil Well Company? Is that about the right figure?

A. Yes, that is about the number of tests that we made.

Q. Can you tell us, of the 7500 tests, how many were made, or approximately how many were made by the stop cock and gear device, and how many by the later developed "J" tool?

A. Perhaps 7,000 of those tests were made by the stop cock and gear type device.

Q. When was the "J" tool or "J" slot tool first commercially used?

A. I think the tool as designed here in court was first used in the early part of 1934, perhaps in January or February.

[fol. 165] Q. And then that was later on changed or improved by putting two valves in there instead of the one that is shown here?

A. No. I think one of the first devices that we used provided for two valves.

Q. Two valves?

A. Yes. So that if one was cut out by gas the other would close.

Q. Is that an optional form of making that "J" tool, with either one valve or two valves?

A. You could add a half a dozen valves.

Q. It wouldn't make any difference?

A. No.

Q. Why do you put the two valves in there?

A. For the same reason as anyone would like to have two valves, so that if one valve cuts out you have still got one that would close.

Q. Why the half dozen valves—for the same reason?

A. Yes. That would be that much greater insurance that if gas cut out three or four of them, then you would still have one left, if you had five. It so happens that gas cuts out the valves in any of them at times.

The Court: Gas?

A. Yes, your Honor. You see, gas brings sand in with it. It is the same as a sand blast, and it will cut the tool if you don't close it.

By Mr. Boyken:

Q. When did you first make tests in the State of California?

A. When did I first make tests in California?

Q. Yes.

A. I think the first test we made was around 1930 or 1931. It has been four or five years ago.

[fol. 166] Q. Was that a formation test?

A. I think the first tests that we made were formation tests. I am not certain.

Q. When did you first make water shut-off tests?

Mr. L. S. Lyon: In California or in some other place?

Mr. Boyken: Anywhere.

A. We made our first water shut-off tests around 1927.

Q. When did you first make them in California?

A. I don't know; I guess about the time we came out here.

Q. And that was when?

A. In 1930 or 1931, sometime around there.

Q. Don't you recall when you first commenced testing in California a little more definitely than that?

A. No, I don't know definitely when we did come in.

Q. We have had quite a discussion here about this so-called "J" tool. What is the correct designation of that tool? Is it "J slot" or "tool"?

A. We designate it "J tool," as distinguished from the stop cock type tool.

Q. Now, I don't know that we have a good explanation of the operation of that tool, and I am going to show you a diagrammatic drawing, colored, which has the valve arrangement emphasized, and ask you if that is substantially the structure of the valve arrangement in the "J" tool. Let us take the figure to the extreme left.

A. Yes; that shows a portion of the valve structure. It does not show how the entire device works.

[fol. 167] Q. No. It is intended to be a diagrammatic drawing, but it is a fair diagrammatic drawing of the valve structure, is it not?

A. Well, it shows two poppet type valves.

Q. The figure at the extreme left shows the valves closed?

A. Yes.

Q. The following figure, the one in the center, does that show the valves closed or open?

A. It shows the valves open.

Q. And the one to the extreme right shows them closed again?

A. The one to the extreme right shows them closed.

Q. So that in the operation of the tool in the well the extreme left figure shows the valves closed, the one in the center shows them open, while the liquid or fluid is flowing upward, and the one on the right shows them closed again, as in the original figure?

A. Yes.

Mr. L. S. Lyon: Is there supposed to be any difference in the first and third figures?

Mr. Boyken: No, no difference; just going in the well, operating, and going out. The first and third figures are the same. I am just trying to get a clear explanation of how this thing works. That is all I am going to use it for.

By Mr. Boyken:

Q. Will you explain to the Court why the valves are closed—first, show the valves, the valve stems and the valve seats. You might do that with a pencil as you go along with [fol. 168] the explanation. I want to get a clear understanding as to how this "J" tool operates with respect to the valve structure.

A. Well, we will take the red object in the first figure. It shows the common poppet type of valve fitting against a black seat to receive a poppet type of valve. The upper valve is of the same structure that is shown here as being yellow.

Q. In order to open those two valves so that the fluid in the bottom of the well, which is packed off by the "rathole" packer, may go upwardly in the pipe, what is done?

A. The drill pipe is lowered away and turned to the right.

Q. The drill pipe is the upper portion, and you say that is turned to the right?

A. Yes.

Q. And by turning the drill pipe to the right what happens with respect to the pin and slot?

A. The pin is turned to the right and follows the slot down and permits the mandrel to pass down and rest on top of the valve for opening the valve. In order for the drill pipe to be lowered away it has to overcome the

hydrostatic pressure in its cylinder surrounding the mandrel or plunger, so that the plunger can be moved down and return to up position, holding the entire testing apparatus down.

Q. Getting back to this drawing, I am going to mark on the figure at the extreme left the pin by the number 1, and the slot by the number 2, and the drill pipe by the [fol. 169] number 3. Now, you say you rotate the drill pipe 3, and the pin 1 then goes in the slot 2, as shown in the second figure?

A. Well, your pin that you have marked number 1 normally is not in the position as shown in this figure.

Q. What position is it in?

A. It is at the top part of the slot rather than at the bottom part, as shown in that figure.

Q. When it is at the top part, in order to open the valve what is done?

A. The pipe is rotated to the right and lowered away.

Q. And then the pin 1 goes into the slot 2, as shown in the second or middle figure?

A. Yes.

Q. When that pin 1 goes into the slot 2 what happens to the valve?

A. The valve is pressed open.

Q. Where is the valve structure, the valve seat? Would that be at the place I mark 4 in the left-hand Figure?

A. Diagrammatic, yes.

Mr. L. S. Lyon: So that the record will be clear, I think this word "valve" is being mixed up here by using it to include the whole valve device and to include a particular part of the valve. Now, you said "valve or valve seat." You meant the valve seat in that question, didn't you?

Mr. Boyken: I believe so. What I want to do is to get a good explanation of this movement here so that the court will understand it.

Mr. L. S. Lyon: I just don't want the court to have any difficulty in understanding that the term "valve" ap- [fol. 170] plies to the entire device, and that the parts that open and close include, for one part, the valve seat. The valve is not the hole and it is not the valve seat or not the part that sits on the valve seat, but is the whole structure that opens to admit the fluid and closes to prevent it from leaving.

By Mr. Boyken:

Q. I have marked the valve seat or intended to mark it by the number 4, and the valve stem in both cases on the left-hand Figure by the numbers 5. Those valve stems go up and down, do they not, in the opening and closing of the valve?

A. They press down and close, as any poppet type valve closes.

Q. In the middle figure those valves are pressed down so that the valve stem is moved downward and unseats itself, is that correct, in both the yellow and the red valves?

A. Yes.

Q. Just trace it, showing the course of the fluid, how it comes upwardly through these open valves.

A. Well, the fluid passes in through the perforations and through the valves, and out through the holes drilled in here, that is, inside and under the valve seat, and the valves are interchangeable. It passes through the seat and up through the hole and up through the center of the mandrel and on into the pipe.

Q. That occurs because both valve stems are pressed downwardly?

A. Yes.

Q. By the operation of the drill pipe?

A. Well, not just pressed downwardly. You have to turn it to the right and then press down.

[fol. 171] Q. Downwardly?

A. Yes.

Q. And that enables the fluid to pass through these valves then and find its way up?

A. Yes.

Q. And in order to close the testing device that is shown in the last figure, which corresponds to the first figure?

A. Yes.

Q. The pin then is brought back from its lowermost position in the slot to its original position, in order to close the valve?

A. Yes. But you don't show it in the original position in this figure.

Q. Well, you mark on there the original position.

A The original position is in the top here.

Q. I will mark that 6. That is the original position?

A. Yes.

Q. And how is the pin brought back to its original position? What is done with the drill pipe?

A. As the pipe is picked up the pin turns the pipe back to the left, and it can move up to the point of original position, where the pin is at the top of the slot.

Q. And that closes the valves then?

A. Yes.

Q. That brings the valve stem upwardly so that it seats at the point marked 4 in the left-hand figure?

A. Yes.

Q. And then the tool is ready to withdraw?

A. Yes.

[fol. 172] Q. Can you re-establish circulation in case something happens to the tool in the well by reason of the use of this "J" tool?

A. You could pump down through it by overcoming the resistance of the springs that hold the valve closed.

Q. Just tell us how you can re-establish circulation there.

A. Well, I don't understand that you would want to re-establish circulation.

Q. Well, suppose you did?

A. Well, if you did you could pump through there.

Q. I am going to ask you if you didn't get out a blueprint which describes that "J" tool, the blueprint I now hand you?

A. Yes; I think we got that out.

Q. That is yours?

A. Yes.

Q. You say in here, "Circulation can be established whenever necessary without opening the tester." Is that a correct statement?

The Court: What is that?

Mr. Boyken: The tester.

A. Well, as a matter of fact——

By Mr. Boyken:

Q. I am asking you if the statement is correct?

A. You couldn't establish circulation without the valves opening. The fluid itself will open them.

Q. Well, let us first find out whether this — a correct statement, "Circulation can be established whenever necessary without opening the tester."

A. Well, with a thorough understanding of this anyone would understand that statement. On the other hand, you [fol. 173] take the stop cock device, if you are going to pump down through the valve you would have to open it. In this particular case the mud fluid pumped in here will open :. So the statement is not literally correct.

Q. Not correct?

A. Not literally correct. It is correct to anyone who understands what is meant by that.

Q. Then it is a half-truth, would you say?

A. No, I wouldn't say that. I would say that you would have to interpret that with some knowledge of the operation of these devices.

Q. How do you interpret that statement? And in interpreting the statement will you show in this diagrammatic view how that circulation can be established?

A. I will read the statement and add the necessary words. It says, "Circulation can be established whenever necessary without opening the tester, since the fluid will automatically open the valve."

Q. Well, let us see how the fluid will automatically open the valve in the "J" tool

A. Well, the pressure against the valve will unseat it.

Q. Can't you give us a little better explanation? Suppose the fluid or the rotary mud is pumped down through the drill pipe and it comes down in the tool here, then will your fluid that is pumped down unseat these valves?

A. Yes.

Q. And the fluid will come down all the way to the bottom and be eliminated through the perforated holes at the bottom?

A. Yes. You can pump all the way down through it. You might do that if you got stuck in the well.

[fol. 174] Q. In order to do that you don't have to rotate the pipe, do you?

A. No, you wouldn't have to rotate it any more than you do to pump through a flow collar and a casing. It has a back pressure valve in it.

Q. Why is it that you reestablish circulation by pumping down through the drill pipe and unseating these valves and eliminating the fluid at the bottom?

A. I don't know that we have ever done that.

Q. Why is this tool constructed so that it can be done?

A. Well, if you got stuck in a well and you wanted to establish circulation, that is one means of doing it. With the other device we use a check valve just above it, so that we can circulate.

Q. I would like to get this over as rapidly as I can, Mr. Halliburton. So that the court will understand the operation of this tool, have you anything else to say with respect to the operation of this tool here to make it clear how the valve structure operates?

A. I think we have pretty well covered it. We have shown that the valves are opened by the mandrel coming down and pressing on the top of the top valve which, in turn, strikes the bottom part of that valve, striking the top part of the lower valve and opening the two valves, it being necessary that the plunger overcome the hydrostatic pressure in a cylinder not shown on these sketches, within the device itself.

Q. And the spring tension does what to the valves?

A. Those are ordinary poppet type valves, the same as you have in an automobile motor, in which the springs [fol. 175] close a valve. In an automobile motor you have a cam that lifts the valve off this seat, compressing the spring, and then the spring closes the valve as the cam moves away. And this is the same type of valve as is used in an automobile motor.

Q. Have you also an equalizing valve in that device, which is not shown in this drawing?

A. I don't know whether there is an equalizing valve shown in there or not. We have used an equalizing valve practically ever since we have been in the testing business.

Q. What is the object of a further or equalizing valve in a structure of this kind?

A. You let the fluid on the outside, by-pass the packer and pass under the "rat-hole" below. We first accomplished that by drilling a hole in the mandrel which the packer was on, and when you pick up the laminated rubber pieces it would drop away from the top and let the fluid pass in to the mandrel and through a hole in the mandrel and then down through the perforations and into the "rat-hole."

Q. Will you put a mark on that drawing to show where the equalizing valve is located?

A. The equalizing valve is located just above the packing member so that it passes inside and past the packer. Apparently it is intended to show an equalizing valve here.

Q. I will mark that "7." That is where the equalizing valve is located, is it?

A. On that particular drawing; yes.

[fol. 176] Q. That is the Figure to the extreme right. Now, how does that equalizing valve work and what is the object of it?

A. It works to permit the fluid from above the packer to pass below the packer.

By Mr. L. S. Lyon:

Q. When?

A. When you get ready to remove the packer.

By Mr. Boyken:

Q. Why do you want the fluid to pass below the packer when you want to remove the packer?

A. In order to take the weight off of it. That is very old in the art. I can show you a patent going back, I think, to 1880, in which they did that. In other words, you would swab the hole in coming out if you packed and fit very close unless you had a by-pass to let it pass.

By Mr. L. S. Lyon:

Q. Do you mean that is an ordinary thing to do in operating packers in an oil well?

A. Yes. That is very old in the art.

By Mr. Boyken:

Q. In other words, if the packer, which I will mark "8", should stick in the well hole, it would be necessary to in some way assist that in removing it from the well, wouldn't it?

A. Yes. You would have to lift the weight of the fluid if it fitted tight enough to swab.

Q. So that you want fluid below that packer?

A. Yes. There is a patent in the prior art there which shows a by-pass, which I can show the attorneys and the Judge.

[fol. 177] Q. I don't think we want that, although I have no objection to it. If there is difficulty in removing this "rat-

hole" packer as shown in the diagrammatic sketch here, you do have fluid below the packer, is that right?

A. Well, it is only when you pick up that you let the fluid pass.

Q. And so the fluid enters at what point?

A. At the point marked "7".

Q. And is eliminated at what point?

A. It passes out through the perforations.

Q. I will mark those "9". So that you have pressure below the packer?

A. Well, so that the pressure is equalized above and below the packer.

Q. Above and below the packer?

A. Yes.

Q. That equalizing valve is not shown in detail on this sketch, is it?

A. No.

Q. Is there anything else about this that you want to explain? Do you have those equalizing valves on your "J" tool?

A. This is a "J" tool. It is a part of the packer and we buy a lot of our packers containing equalizing valves.

Q. And you use equalizing valves?

A. Yes.

Q. Is there anything else about this "J" tool that you wish to explain further?

A. If the court understands it, I don't think there is.

Q. Otherwise, I will pass on to other questions.

[fol. 178] The Court: I will have a few questions as soon as you are through.

Mr. Boyken: I am finished on this subject.

By the Court:

Q. Why does not the valve open when number 1 is in the first position?

A. That pin limits the movement of the mandrel down to where it can't touch the valve.

Q. Why, or in what way, does it limit it?

A. The movement is limited by that pin, the downward movement. It has to move farther so you have to turn the mandrel around. The pin is on the mandrel and you turn it around to where the slot is extended down further,

and that permits the mandrel to move down to a point where it strikes the valve.

Q. Do you mean the pin could go no farther than as shown——

A. As shown by that slot.

Q. In the first position?

A. Yes; when you are just running into the well. You have to turn to the right to get over in the slot before the mandrel can strike the valve and open it.

Q. Why don't you put your stop place a little bit further and even with the lower end of the slot and not turn it?

A. If you did that and ran into a tight place with your packer and the packer would hold up on the pipe, your mandrel then could come down and strike and open your valve and you would open it before you reached a point where you wanted to set your packer. Sometimes in making tests the seat and packer will leak a little bit. So we pick up and we can spud or move the pipe up and down and [fol. 179] press a lot of weight there by means of that pin, without opening the valves, and then we turn to the right and open it after we have effected a new seat that does not leak.

Q. What do the dotted lines indicate?

A. That indicates a hole through the mandrel. You see, that is not shown in detail. It doesn't show this plunger in here or pressure cylinder. It doesn't show the whole detail. We have a much better drawing for explaining the operation of this because this doesn't show all of the details.

Q. In the middle figure the valves are shown in open condition?

A. Yes, your Honor.

Q. That is when the product, or whatever you are getting from the "rat-hole," goes up into the—what you *you* call it?

A. Into the drill pipe; yes, sir.

Q. Into the drill pipe?

A. Yes, sir.

Q. How do they get past those valves?

A. The valve is moved from the seat and its passes through the seat around the valve stem and up through ports drilled in the valve seat member for that purpose.

Q. Wait a minute. I don't understand that. It passes around the stem of the valve? Would you call that the stem of the valve?

A. Yes, your Honor. You see, this white line here shows no metal. In other words, that is a hole. Now, you see over in the first figure the red valve is right up against the seat. In the center part you will see the red valve is shoved down [fol. 180] away from the black seat, leaving an opening surrounding the stem so the fluid can pass through it.

Q. What does the black indicate?

A. The black indicates the seat while the red indicates the valve that fits the seat.

Q. The seat being steel, solid steel, is it?

A. I think we make those out of bronze; any good metal.

Q. At any rate, solid metal?

A. Yes, sir.

Q. Trace the course of the fluid that you are getting as it goes up that valve again. You did that before but I didn't quite follow it.

A. I will just draw a line.

Q. I wouldn't do that.

A. Well, it comes up through and in here and then it passes around this seat and right in between that black and the red, and up through holes drilled through this seat member into the bottom part of the seat, only the lower portion of it is ground to fit this valve.

Q. Where do those openings open?

A. They open in the chamber immediately under the upper valve.

Q. Around and in contact with that spring?

A. Yes; in contact with that spring.

Q. I would think that obstructions would get into the coils of the spring and prevent its functioning.

A. No, your Honor. Those springs are very satisfactory. In other words, any mud that would get in between the springs would be squeezed out as it was shoved down. And [fol. 181] it is compressed to open the valve and then it comes back to its normal shape, closing the valve. Those springs will hold a little over a hundred pounds, so that they will retain the sample of fluid when the pipe is pulled out of the top of the well.

Q. Continue with your explanation.

A. Then the fluid passes around this upper valve the same as it did the center valve, that is, between the valve and the seat, and up through the openings and into holes drilled into a member screwed onto the end of the mandrel

and follows up through the center of the mandrel and into the drill pipe.

Q. Are those two diagonal marks the holes you referred to?

A. Yes, your Honor. There are four holes, I believe, drilled into that member that is threaded onto the mandrel, leaving a solid place in the center to strike the valve. In other words, the fluid goes into those diagonal holes and into the center. If we had drilled a hole straight through, when the mandrel came down and struck the valve it would close up the hole so the fluid couldn't get in it. So we drilled diagonal holes and left sufficient material in the center to press the valve open. Those valves are nearly 2 inches across perhaps, or more, and you will have 3,000 pounds pressure per square inch holding that valve closed. So you have to let enough weight down there to press the valve open against that hydrostatic pressure.

Q. What does the blue indicate?

A. That indicates the mandrel and the member screwed on the end of the mandrel to open the valve.

[fol. 182] Mr. Boyken: We would like to offer the diagrammatic sketch in evidence in connection with the testimony of the witness and ask that it be marked the defendants' exhibit next in order.

The Court: Very well.

The Clerk: Defendants' Exhibit B.

Mr. Boyken: We also offer in evidence the blueprint identified by the witness and ask that it be marked Defendants' Exhibit C.

The Court: Very well.

The Clerk: Defendants' Exhibit C.

(Book of Exhibits, p. 315.)

Mr. Boyken: I am going to consider the Simmons patent briefly. Have you a copy of the Simmons patent at hand?

The Court: I have two copies here.

By Mr. Boyken:

Q. First, Mr. Halliburton, I call your attention to the use of the word "casing" in several places in the specification. For instance, if you will look on page 2, line 62, it says, "A casing 23." I am going to ask you if that really is

a casing 23 or is that a mistake. I haven't been able to make up my mind about that.

A. It says, "A casing 23 or other means adapted to provide an empty chamber or conduit which may be lowered into a well bore and, when so lowered, provide an empty chamber adjacent the formation to be tested." That could [fol. 183] be any other string of pipe, tubing or drill pipe or casing.

Q. A casing is a definite thing, isn't it, in the well drilling art?

A. Well, of course,——

Mr. L. S. Lyon: Are you asking as to how the term is used in the patent or how it is used somewhere else?

Mr. Boyken: Right now I am asking if a casing is a definite thing but I will ask your question in a moment.

A. Well, after it is installed in the well as casing I would say it is a definite thing but I have seen line pipe, what is commonly termed line pipe, run in as casing, and I have seen drill pipe used as casing. So, really, the term "casing", broadly speaking, is a pipe that is permanently installed in a well.

Q. Suppose we turn to the drawing and look at Figure 1. Up at the top of Figure 1 you will see the number 23. Now, 23 is not really the casing, is it?

A. 23 is the empty conduit.

Q. It is a drill pipe, isn't it?

A. It is drill pipe; yes. But, after all, suppose you substituted a string of tubing for drill pipe. Then it would be a string of tubing.

Q. Would it be a string of casing?

A. It would be if you set it as a string of casing.

Q. Then, you think that the term "casing" is properly used at that place, do you?

A. I think, in the light of the specification, that term is all right.

[fol. 184] Q. I also call your attention to the same use on the same page, that is, page 2, line 68, and page 3, line 46. Do you see where it says "a casing 23," in both of those cases?

A. Yes. It says, "In the preferred form of the invention where this member comprises a casing 23, there will thus be provided an empty chamber or conduit extending from

the formation to be tested up to the top of the well hole." Of course, it actually means a string of pipe.

Q. It means drill pipe?

A. Well, not necessarily drill pipe. I wouldn't limit the use of this patent to a drill pipe. In other words, any equivalent of drill pipe may be used. We have used tubing to drill with.

Q. But don't you believe that the word "casing" is a misuse of that word as you know casing in the well-drilling art?

A. No.

Q. You don't think so?

A. I think the specifications are very definite and can be readily understood by anyone familiar with the art.

Q. That isn't what I asked you. I asked you if the word "casing" was properly used in this connection.

A. I think it is properly used. I think that anyone can read this and understand it.

Q. You were reading a portion from the end of page 1 to the top of page 2. Just continue that, where it says, "whereby--" or I will read it for you. I am reading from page 2, line 2. "in certain cases when the cognate fluids of the formation are under sufficient pressure, the [fol. 185] well may commence producing through this conduit." What does that mean?

A. That means whatever you are using as a test string, as explained in the balance of the patent.

Q. Suppose we have a string of pipe, with one of your testing tools at the bottom, and we have the valve open, how can that well commence producing through that drill pipe?

A. What is meant by that term is that it might flow out of the top of the well.

Q. Do you mean the fluid from the bottom of the well would flow upward through the testing device and then continue flowing upward through the drill pipe and out of the top of the well?

A. Yes. That is what this is, a method of making a production test, a productivity test. That is what the invention is all about.

Q. And in such a case the fluid, whatever it is, actually comes out of the top of the well hole?

A. If it is under sufficient pressure, it will; yes; and you don't close the valve at the top.

Q. And under those conditions you would have a producing well?

A. Well, it wouldn't be on production in the sense that it was a producing well. You only do that to test it. You wouldn't set it there as a permanent thing.

Q. But you would have a producing well in so far as the fluid came over and out of the top?

A. You would be making a production test.

Q. I notice in certain of the claims the expression is used, for instance, in claim 9 which has been referred to here, at [fol. 186] the end of the patent, on page 4, line 81, "a packer adapted to be positively pressed against the walls of the formation." We know what a packer is but tell us how it is positively pressed against the walls of the formation.

A. I don't understand that you could very well set one in on the formation to hold it up and to hold the fluid back without positively pressing it against the formation.

Q. What do you mean by "formation"?

A. I mean that shoulder on the "rat-hole" where you would set it. If it happened to be used as a wall packer in an open hole, then that would be positively pressed against the formation. I don't understand—if you pressed it against the formation, it would be positively pressed.

The Court: What is that statement? I don't understand what?

A. I don't understand that it could be anything but positively pressed.

By Mr. Boyken:

Q. Suppose we were making a water shut-off test and were packing against the inside of the casing, would you think that in such a case the packer would be positively pressed against the walls of the formation?

A. No; I don't think so.

Q. Do you consider that so-called water shut-off tests, where you pack against the inside of the casing, are covered by the Simmons patent in suit?

A. Yes.

[fol. 187] Q. How do you make that out? How do you reason that?

A. I think that it comes within claim 18.

Q. Claim 18?

A. Yes.

Q. That is a method claim. You have two method claims?

A. Yes.

Q. Claims 8 and 18?

A. Yes.

Q. Let's eliminate those method claims for a moment and I will come to that again. Do you consider that the apparatus claims are readable on water shut-off tests?

A. All those claims that are limited to pressing the packer against the formation wouldn't come within the use of setting a packer within a string of casing, I don't think.

Q. Of the 10 apparatus claims in suit—you are familiar with your own patent here, are you not?

A. Yes.

Q. You know, don't you, that that limitation appears in all of those apparatus claims?

A. I think that they are all limited to that.

Q. That is, to formation tests as distinguished from water shut-off tests?

A. Yes.

Mr. Boyken: I am going to make that clear to your Honor in a few moments.

A. But claims 8 and 18 are not limited to that.

Q. Those are the two method claims?

A. Yes.

[fol. 188] By the Court:

Q. Let me interrupt at this point. Do I understand that you both agree there is any difference between a water shut-off test and any other kind of a test, for gas or oil, for instance?

A. I don't agree that there is any difference, your Honor. The method claims are old. I wouldn't state that the apparatus claims do or do not cover the making of a test where you set the packer within the casing.

Mr. L. S. Lyon: I think, your Honor, that is a question of law. The witness has said that as far as the claims are concerned they include the statement that the packer is pressed against the formation. Now he says, if you set the packer in the pipe in making a water test, you are not pressing it against the formation. I think he has said all

that he can say as far as testimony is concerned and that beyond that is a question of law.

The Court: As I understand this proposition, a water test is made in exactly the same way that any other kind of a test is made, if I understand the proposition correctly. I may be mistaken about that, though. Counsel and the witness seem to have a different opinion.

Mr. Boyken: No, your Honor. Those tests are made differently. And, if I may be permitted at this time, I would like to get the witness' view on that and develop that before we go back to those claims.

The Court: You will have to make clear to me the difference in operation between a water test and an oil test.

A. Your Honor, the steps are exactly the same, identical.

[fol. 189] By Mr. Boyken:

Q. Will you explain the difference between a water shut-off test where you press the packer against the inside of the casing and the formation test where the packer is placed positively against the formation? And in doing so kindly refer to Defendants' Exhibit C.

A. In the drawing marked "Casing test water shut-off" it will be seen that there is illustrated a string of casing that has been cemented in a drilled hole.

Q. Will you run your pencil along the casing on both sides?

A. Yes. Well, the casing is marked.

Q. Please run your pencil along the casing on both sides of the well hole and on the opposite side. Now, where is the drill pipe that we commonly know? That is a different thing, isn't it?

A. The drill pipe is within the casing.

Q. And is it where I am now pointing the pecil, which is marked "Drill pipe"?

A. Yes. But we can't get this pencil into the record.

Q. It says "Drill pipe"?

A. Yes.

Q. That is the drill pipe?

A. Yes.

Q. And the casing is where I am now running my pencil, which is also marked "Casing," is it?

A. Yes. And the casing shoe is shown not to come all the way to the bottom. In drilling out the cement they make

a few feet below the casing shoe. Then in running a tester you use a packer that is set on the bottom joint of the casing and you make a test not only of any fluid that might [fol. 190] leak down back of the casing but also test the formation immediately adjacent and below the shoe of the casing that has been drilled. It is necessary to drill below the shoe in order to make certain that, if any water should come down back of the casing, it can get into the casing. And you also test the producing zone if the casing is set just above the producing zone. If the formation below the shoe contains water, you would secure a production test or a productivity test of that water. And the only difference is that the packer is set in the bottom of the casing rather than against the formation.

Q. Show us where the packer is set in the case of a water shut-off test.

A. The packer is set in the bottom joint of the casing.

Q. Put your pencil there on the left-hand figure of this exhibit.

A. This is not a detailed drawing and doesn't show the joint, but it is set just above the bottom of the well 6 or 8 feet.

Q. Is it set substantially where it says "Hook Wall Casing Packer" on this exhibit?

A. Yes. There is no detailed drawing shows the bottom joint of pipe.

Q. That packer in such a case is set against the interior walls of the casing, is it not?

A. Yes; sealing off the mud fluid above the packer.

Q. So that the packer is not positively pressed against the formation?

A. It is pressed against the casing.

Q. Against the casing?

A. Yes.

[fol. 191] Q. Now, take the formation test which is shown by the third figure from the left-hand side. There you have a packer which is pressed against the formation, do you not?

A. Yes. And so is the second one.

Q. You have your packer pressed against the formation instead of the casing?

A. Yes.

Q. And in the first one, the one to the extreme left, the packer is set against the interior walls of the casing?

A. Yes. You could use the same type of packer in making the casing tests that you could use in making the wall packing tests.

Mr. L. S. Lyon: I think you should explain, if you want to make a formation test without a "rat-hole", that you use a different style of packer, which is the kind that is illustrated in the second sketch.

Mr. Boyken: Yes. I will be glad to develop that.

Q. You say the figure on the left-hand side is a casing test water shut-off?

A. Yes.

Q. The two other figures to the right are both formation tests, one using the wall packer type and the other the cone packer type?

A. Yes.

Q. The cone packer type is what we have been calling the "rat-hole" tester, is it not?

A. Yes.

Q. Will you explain the one that is called the wall packer type? How does that differ in a formation test from the "rat-hole" type? (After recess.) We were considering [fol. 192] the difference between packing off against the inside of a casing and against the formation at the noon recess and you were explaining that situation with respect to Defendants' Exhibit C. Can you tell us, briefly, the difference between packing against the inside of the casing as it is shown in the left-hand view of Exhibit C and packing against the formation either in the middle view or the third view from the left-hand side?

A. There is really no difference in setting a packer. You would use the pipe to set the packer in the same manner and it would depend largely on the kind of a packer that you used. We can take the formation wall packer as shown in the view here and set that in a casing and make a shut-off the same as you can use that same packer to shut off in the wall of the formation. In other words, you really stand a better chance for making a shut-off with the formation wall packer in a casing than you do in the formation itself.

Mr. Boyken: I move to strike out that answer, your Honor. I asked for the difference between these two.

The Court: The answer may stand. State the difference.

By Mr. Boyken:

Q. State the difference between the two.

A. The difference between the two what?

Q. Between packing off against the inside of a casing, as you have shown it in this exhibit, and packing against the formation.

A. I don't know what you mean by the difference in packing off. If you pack off, you have packed off and you [fol. 193] would use a packer. The packer might be of different construction.

Q. Suppose you want to pack off in a casing in order to make a shut-off test, what is the first thing you do after you get your tool in position?

A. To set your packer.

Q. How do you set your tool in packing off? What is the first step you take?

A. It would depend on the type of packer you use.

Q. Suppose you take this view here in Exhibit C, the left-hand view, and explain that type of construction.

A. That is a hook wall packer in which you release slips.

Q. Where are those slips?

A. The slips are shown just below the packer.

Q. Are the slips shown by the line which points to a portion of the packer labeled "Hook wall casing packer"?

A. Yes.

Q. How many of those slips are there?

A. I don't know how many.

Q. How many do you have in yours? This is yours, isn't it?

A. Why, we buy our hook wall packers.

Q. How many do you use when you make a test of this kind?

A. I think they usually have four segments of slips.

Q. And what do you do with the slips?

A. If you use a hook wall packer, you set the slips to set the packer.

Q. You set the slips first?

A. Yes.

[fol. 194] Q. What do you mean by setting the slips?

A. I mean you set the slips to hold the packer as distinguished from an anchor packer in which the anchor holds the packer.

Q. After you set the slips then what is the next thing that is done?

A. The next thing that you would do would be to open your valve after you had set your slips and set your packer.

Q. How do you set your packer?

A. By putting a weight on it the same as you would set any packer.

Q. Then what does that do to the packer? Does it expand the packer against the interior walls of the casing?

A. Well, yes.

Q. Your answer is yes? Isn't that the answer?

A. Yes.

Q. The packer is expanded against the interior walls of the casing and that packs off what is below the casing from what is above?

A. Yes.

Q. And when it is so packed off then you open the valve, do you?

A. In the testing device; yes.

Q. That is what I am talking about.

A. Yes.

Q. You open the valve?

A. Yes.

Q. And how do you test whether the water is shut off or not there?

A. You don't necessarily test whether the water is shut off. Of course, if water comes into the pipe, you know [fol. 195] that it came from the formation immediately below the casing or came from a leak around it. In either case you would have to shut that water off by a squeezed cement job or a string of casing.

Q. That is what you want to find out, is it?

A. That is one of the purposes of the test, yes.

Q. And the packer is set against the interior walls of the casing in such a test?

A. Yes.

Q. In your formation test—Let us take the third view from the left-hand side—is the packer set against the casing or against the formation?

A. It is set against the formation.

Q. And by "formation" is meant the bare well hole, without any casing inserted, is it?

A. Yes.

Q. How do you positively press that packer against the formation? Is it due to the weight of the drill pipe, in the case of the "rat-hole" packer?

A. If you set the packer in against the formation and add weight to it you certainly press it against the formation.

(Question read, at the Court's request.)

A. By allowing a portion of the weight of the drill pipe to press the packer down after it comes in contact with the formation.

Q. There are no slips used in that case, as in the case of the packer set against the interior of the casing, are there?

A. No.

The Court: I am not clear on what is meant by "slips," although I believe the witness explained it.

[fol. 196] By Mr. Boyken:

Q. Well, let us go back to the casing type of packer. You insert your equipment in the casing?

A. Yes.

Q. And in order to make a test to find out whether there is any water below the point of the casing you want to set your packer in the casing above the lower portion of the casing; is that it?

A. Yes.

Q. Now, you have your equipment set, but there is still a space inside for the liquid below to rise to the top, because it has not been packed off?

A. Yes.

Q. How do you pack off this casing there so as to make a seal, let us call it, between what is below and what is above the packer? What is the first thing you do?

A. Well, if you use——

Q. Well, let's use this, what you have right here in this drawing.

A. Well, to do that you set the slip which carries the weight of the drill pipe, and after the slip has been set you add weight to the pipe, the weight of the pipe to the packer, to expand the rings out against the wall of the casing. If you use an anchor packer, such as the packer over here, instead of setting the slip the anchor strikes the bottom

of the well, and the weight is added to the packer and you expand it.

[fol. 197] Q. Well, please confine yourself now to the left-hand view. Let us get that settled. I want to first know what these slips are and what their function is.

A. You want me to distinguish the difference between an anchor packer and a hook wall packer, or how an anchor packer is operated?

The Court: No. I guess counsel wants to know the same thing that I do, what a slip is.

A. A hook wall packer has a slip——

The Court: I know, but I don't know what a slip is.

A. Well, a slip, there are segments that are wedge-shaped that can be set in the casing to carry the weight of the pipe above. We will take a tubing test that has——

The Court: What is the slip made of?

A. They are made of steel.

By Mr. Boyken:

Q. Sort of fingers that expand in order to obtain an anchorage in the casing; is that it?

A. No, not fingers at all.

Q. What are they, then?

A. They are circular wedge-shaped steel members made in segments that come to the wall of the casing, and fasten in such a manner that they can be wedged up and carry the weight of the casing.

The Court: The weight of the casing rests upon these slips?

A. The weight of the drill pipe, your Honor.

The Court: I mean, the weight of the drill pipe rests upon these slips, and that weight then will be transmitted no further?

A. Yes. It will hold up the weight of the drill pipe.

[fol. 198] The Court: Yes.

Mr. L. S. Lyon: Your Honor understands that these different types of packers were used in the oil business commonly before this invention?

The Court: Yes.

Mr. L. S. Lyon: Both the hook wall type and the "rat-hole" type. Both of them were common implements used in the industry.

The Court: Yes.

Mr. L. S. Lyon: So the question that is being asked now as to the operation of a packer has to do with the packer itself rather than anything to do with anything that is new in this invention.

By Mr. Boyken:

Q. Now I show you a model and ask you to point out these hooks that you spoke about. Are they the ones I have my pencil on?

A. Those are the slips.

Q. I mean the slips. Are those the slips?

A. Yes.

Mr. L. S. Lyon: Suppose you demonstrate to the Court how you set one of those small packers.

A. Yes. Your Honor, these springs here are compressed so that when you set it in the casing you can turn the upper portion without turning this lower portion, which makes it possible to release the slips so that they will come up and engage the casing.

Mr. L. S. Lyon: Can you release that? That is what you call tripping one of those wall packers, is it?

A. Now, it is released and shoved up to where it engages the casing, and with those teeth on there it holds in the casing, so that you can hold the weight up, so that you can lower the drill pipe away and expand the packer.

[fol. 199] By Mr. Boyken:

Q. It is a sort of an anchorage?

A. Yes. This is an Olympic casing packer. That is the same people that the Halliburton people buy their packers from.

The Court: Well, would you say that these rough projections that make an anchorage against the side of the casing are what we have been calling slips?

A. Yes, your Honor.

By Mr. Boyken:

Q. Where is the so-called packer portion in the model you hold?

A. The packer portion is the black rings.

Q. These four black rings at the top of the model?

A. Yes

Q. And are these four black rings expanded so that there is a seat at that point in the casing?

A. Yes.

By Mr. L. S. Lyon:

Q. By the weight?

A. By the weight of the pipe.

By Mr. Boyken:

Q. The weight of the pipe pressing downward expands these four black members and there is a seat at that point?

A. Yes.

Q. That is a common way of packing in a casing isn't it?

A. That is one way. But you can take the same rings with an anchor packer and when the anchor strikes the bottom of the well the weight can be applied to the packing to expand it out against the wall of the casing.

[fol. 200] Q. At any rate, the model that you have there substantially shows the matter which you have drawn on Defendants' Exhibit C?

A. Yes.

Q. When you pack against the formation—or let us take the "rat-hole" form of packer. Of course, you dispense with these slips and all of these other matters that are on this exhibit, except that you still have the packer?

A. Yes.

Q. So that there is a difference between packing off inside of a casing, as it is shown here, and the so-called formation packing off, with the "rat-hole" packer?

A. Well, with the "rat-hole" packer, yes, but with the wall packer there is no difference.

Q. And the wall packer is this one that is the second view from the left-hand side?

A. Yes.

Q. You don't have any slips there, of course?

A. Not with the anchor wall packer.

Q. You don't make any water shut-off tests with the wall packer, do you?

A. Yes; sometimes we do.

Q. Aren't they nearly all made by packing off in a casing?

A. It would all depend on how much hole you had below the casing. You wouldn't want to place too much weight on the anchor. But we do make tests right along with sub-

stantially the same packer inside of the casing that we use to make a wall packer formation shut-off.

Q. But in that case the packing is done against the formation rather than against the interior of the casing?

A. No. Sometimes it is done right against the casing.

[fol. 201] Q. When you are making a casing test you pack off against the interior of the casing, do you not?

A. Yes. But the operation of the device would be exactly the same whether it was in the casing or out of the casing.

Q. I didn't ask you that. I asked you a simple question there and I will ask it again. When you are packing off against the inside of a casing the packer presses against the interior of the casing in order to shut off the water below from above?

A. Yes.

Q. And when you are making a formation test you pack off against the formation instead of the casing, is that correct?

A. Yes. But the operation of the device would be the same.

Q. You couldn't make a casing test by using that "rat-hole" packer and by packing off in the interior of the casing, could you?

A. You couldn't pack off in the casing; no.

Q. Let's get back to the patent. You told us this morning that you did not believe any of these apparatus claims covered the packing against the casing, and you said that the method claims did.

Mr. L. S. Lyon: I object to that. He didn't say that.

Mr. Boyken: I so understood the witness.

The Court: Finish the question but don't answer it until there is an opportunity to object. Read the question as far as it has gone.

(Question read by the reporter.)

[fol. 202] By Mr. Boyken:

Q. Will you explain how the method claims cover packing off against the interior of the casing as distinguished from packing off against the formation?

A. The apparatus claims do not cover any method of testing a well. They cover the apparatus which you use to test the well. To manufacture the apparatus that you

use to test a casing for a water shut-off will infringe the patent as readily as the same apparatus manufactured to test a formation will infringe the patent. The patent does not necessarily not be infringed by manufacturing and using—

Mr. L. S. Lyon: Are you referring now to the apparatus claims?

A. I am referring to the apparatus claims. You will infringe the apparatus claims if you manufacture an apparatus that comes within the scope of those claims, though you might use that apparatus to do something else with it.

By Mr. Boyken:

Q. Packing off a casing, for instance?

A. Yes; certainly. If you manufactured it to pack off in accordance with the claims, and you used it to pack off in the casing, I would say that you infringed the claims.

Q. You have changed your mind in that respect since this morning, haven't you?

A. I think my testimony is very clear on that. You asked me if in using it would I infringe.

Q. I want to call your attention to claim 9 as a typical apparatus claim, the one that you previously referred to. As one element there it says, "carrying a packer adapted to be positively pressed against the walls of the formation." [fol. 203] In the case of a casing test how does that language, "positively pressed against the walls of the formation," apply to packing off in a casing?

A. If you manufactured an apparatus with a packer that would or could be used to press against the casing or the formation, you would infringe that claim.

Q. That isn't my question, Mr. Halliburton. I am going to read you an element of claim 9, namely, "a packer adapted to be positively pressed against the walls of the formation." How can that be readable on a packer that packs against the interior of a casing?

A. Don't you think that where that is capable of expanding against the casing it would be capable of expanding against the formation and packing off the formation?

Q. What does the word "positively" in that claim signify to you?

A. It would signify it was so pressed against the formation that it would keep the fluid from passing out.

Q. The rest of the sentence is, "pressed against the walls of the formation." Now, doesn't the word "positively" have some significance to you?

The Court: Is there any place where the word "positively" is left out?

Mr. Boyken: I don't know of any place where it is left out in the apparatus claims. It appears in every one of the apparatus claims in suit.

A. The only significance I can see is that it is just positively pressed. The word "positively," as I understand it, means to positively do a certain thing and in this particular instance it says "pressed against the formation."

[fol. 204] Q. Doesn't it mean "surely" or something of that kind?

A. I guess you could say "surely."

The Court: What is that word you are using?

Mr. Boyken: Surely. "Certainly pressed" is another one.

By the Court:

Q. Does it mean forcibly pressed or effectively pressed?

A. I thing those terms would be just as effective and would mean substantially the same thing.

The Court: It splits the infinitive pretty badly but that is not a mechanical difficulty, I suppose. That word, however, is often found in patents, is it not, that is, "positively"? I never did know exactly what it meant in patents.

By Mr. Boyken:

Q. What does the word "positively" mean as it appears in these claims, where it says "positively pressed against the walls of the formation"?

A. Well, it means the adding of weight and expanding the packer against the formation to be packed off, expanding it. In other words, it was an additional weight for the purpose of expanding the packer or pressing the packer against the formation. There was some question as to whether or not the packer, a cone packer, could be pressed or expanded against the formation, and so the words "positively pressed against the formation" were inserted in the claim.

Q. You were there in the Patent Office, I understand, and your application stood rejected on all those claims except the two method claims; isn't that correct? Do you remember that?

[fol. 205] A. We had a conference, I remember a conference with the Examiner, in which we inserted that word in the claims, but I do not remember that it was rejected.

Mr. L. S. Lyon: Maybe Mr. Halliburton could look at the file wrapper and he would remember about it.

The Court: Is the file wrapper on the patent itself in evidence?

Mr. L. S. Lyon: Yes, your Honor.

The Court: And is the file wrapper on this second device in evidence?

Mr. L. S. Lyon: Yes; that is in evidence. We have the file wrapper of the patent in suit here.

The Court: That is in evidence, as I understand it.

By Mr. Boyken:

Q. All right. I will hand you the file wrapper of the Simmons patent in suit and ask you to turn to the very last rejection just before the patent issued. Now, that is dated December 4, 1929. It is toward the end of that file wrapper, where the Halliday two patents are cited and all the apparatus claims here in suit are rejected. It is paper No. 19.

A. I don't see anything in paper 19 that would indicate that that kind of a limitation was——

Q. No, Mr. Halliburton, not paper 19. Paper 19 was the rejection of all the apparatus claims here in suit on two patents to Halliday. Then in paper No. 20, which is the following one, the limitation that I speak of, "positively pressed against the walls of the formation", was inserted in all these application claims, in order to permit them to issue. Do you see that?

A. Yes.

[fol. 206] Q. That amendment and argument was put in there after your interview with the Examiner, was it not?

A. The rejected claims had been amended pursuant to an interview with the Examiner having charge of this application. This had been done to facilitate the consideration of the case and to place the claims in better form. "It is not admitted by applicant that the Halliday patents, cited in the last official action, disclose the invention or meet the

rejected claims. These patents both disclose means for cleaning out perforations in a well casing."

"The Court: Wait a moment. I think the witness can answer the question without reading the claims. He is asked if the word "positively"——

Mr. Boyken: "positively pressed against the walls of the formation.

The Court: If that expression was not put in in response, or, rather, after the Examiner had refused to allow the claims. That is the purport of the question, isn't it.

Mr. Boyken: Yes, your Honor.

The Court: He can certainly answer that yes or no, because he was there and handled the whole business.

Mr. L. S. Lyon: I know, but he is referring now to the very document itself, your Honor.

The Court: He may refer to it, yes, but he must answer the question, because it isn't necessary, I think, to read what is written there in order to answer that question.

Mr. L. S. Lyon: The question is susceptible of misunderstanding, or the answer is, to it. What the witness wants to point out is that, while these words were added following that interview, that they were added for a totally different [fol. 207] reason, and that the statement was made in adding them that they were not added because of the rejection of any prior art.

The Court: Read the question, Mr. Reporter.

(Question read by the reporter.)"

The Court: Now answer that question yes or no.

A. Yes.

The Court: All right. Now you may make whatever explanation you want to.

A. The law examiner had cited a patent that had some packing elements that moved up and down in the casing, and he wanted to distinguish these claims from that packing element, a piston that moved up and down, so positively pressing; in other words, press in such a manner as to seal off without moving, in other words, to distinguish this from the device where the packing element worked as a piston in this cleaning device to shove fluid in and out through the perforations.

By Mr. Boyken:

Q. Now, Mr. Halliburton, after you inserted that phrase in all the apparatus claims here in suit the patent was allowed, was it not?

A. No. It was a long time before it was allowed.

Mr. L. S. Lyon: There was another interference.

By Mr. Boyken:

Q. There was no further action of the Patent Office or no further amendments? I thought you were familiar with this file wrapper, Mr. Halliburton. There were no further amendments or no further actions of the Patent Office?

A. There were actions. The claims were allowed after that, but there were a lot of actions in the Patent Office after that.

[fol. 208] Mr. L. S. Lyon: There were hearings in the Patent Office on the patentability of this matter in the Edwards interference. There was the decision of the Board of Appeals, which I offered in evidence. All of that came after this incident.

The Court: Well, the question is, of course, if the claims were allowed after this amendment was made, which literally is true, of course.

Mr. L. S. Lyon: Yes.

The Court: Probably that wouldn't tell the whole story, yet that is the fact.

Mr. Boyken: Well, I want to tell the whole story, your Honor.

The Court: Very well.

By Mr. Boyken:

Q. Was there anything further done to these claims between the date this phrase was added to those apparatus claims and the time they issued in the form of a patent? Were any further amendments made to the claims?

The Court: Do you know, Mr. Halliburton?

A. I don't remember, your Honor. I remember that we cancelled one claim and added another claim.

By Mr. Boyken:

Q. Aren't you familiar with the prosecution of this application?

Mr. L. S. Lyon: It only lasted seven years, and to ask him what happened I think——

The Court: It is like the trial of Warren Hastings, and even then the House of Lords disagreed, I believe. You have finished that. Go on.

[fol. 209] By Mr. Boyken:

Q. You spoke about these interferences. The Simmons patent here in suit is in interference at the present time, isn't it?

A. Yes.

Q. With whom is it in interference?

Mr. L. S. Lyon: I object to that as not the best evidence, your Honor. It is not in interference on any of the claims involved in this case, and if there is going to be any question about an interference in regard to some other claims that are not here involved, the interference records should be produced.

Mr. Boyken: I have them here, your Honor.

The Court: Just what is the importa ce of that in this litigation?

Mr. Boyken: The importance of it in this litigation is that the right of Mr. Simmons to have a patent in the way this patent is issued is now being questioned and being contested. Somebody else claims the right to make these claims, rather than Mr. Simmons, in that patent.

The Court: You say they are now being contested?

Mr. L. S. Lyon: Not these claims.

Mr. Boyken: Yes, your Honor.

Mr. L. S. Lyon: Not these claims, Mr. Boyken.

Mr. Boyken: These claims.

The Court: Do I correctly understand you that that is being done in the present suit?

Mr. Boyken: No, your Honor. There is a suit filed in the Supreme Court of the District of Columbia by Charles R. Edwards against John T. Simmons, Mr. Halliburton and others, an that suit is one to compel the issuance of a patent to Mr. Edwards as against——

[fol. 210] The Court: The present patent?

Mr. Boyken: Yes, the present patent. Not all of the claims of the present patent, I don't believe, but many of the claims of the present patent. Mr. Edwards has filed a suit there claiming that the claims should go to him rather

than to someone else in the patent. I have a certified copy of the proceedings.

The Court: Well, assuming so, would that not mean merely that Mr. Edwards ought to be an intervenor here or be a party here?

Mr. L. S. Lyon: If your Honor please, as far as Mr. Edwards is concerned, before the patent was granted to Mr. Simmons the interference contest was heard in the Patent Office between Edwards and Mr. Halliburton, and decided against Mr. Edwards by the Board of Appeals of the Patent Office, and then the patent was issued to Simmons, and Mr. Edwards filed a suit in the nature of an appeal in the District of Columbia, and has never brought that suit on for trial, but he appeared as a witness and with his other witnesses before Judge Bryant, and we tried out the question before Judge Bryant of whether Mr. Edwards was the first inventor, tried it over again, the same question that we had had decided in the Patent Office, and Judge Bryant decided it the same way that the Patent Office decided it. I understood from Mr. Boyken that they were not going to rely on any claim in this case that Mr. Edwards was the inventor.

The Court: Let me ask this. Were there not pleadings in the Texas case to which the evidence was responsive?

Mr. L. S. Lyon: Yes.

The Court: Are there such pleadings here?

[fol. 211] Mr. L. S. Lyon: Yes, in this case, but I understood that Mr. Boyken was not going to rely on that defense. If he wants to, that is all right with me, but I don't understand that you intend to offer any proof here that Mr. Edwards was the prior inventor.

Mr. Boyken: I would like to explain this situation. There was an interference in the Patent Office between Simmons and Edwards relative to who was the first inventor. That interference was won by Edwards, and it was decided that Edwards, and not Simmons, was the first inventor. Then there was an appeal taken, and the Board of Appeals reversed the lower tribunal and decided that Simmons, rather than Edwards, was entitled to these claims. So there was a decision each way in the Patent Office. Now Mr. Edwards has filed a suit in the Supreme Court of the District of Columbia, and the suit is between himself and Simmons and Halliburton, and he is now claiming in that suit, which is untried——

Mr. L. S. Lyon: No, it isn't on trial.

Mr. Boyken: No. It is untried, I said. It is pending. It hasn't been disposed of. In that suit Edwards claims that he is entitled to all of the claims of the patent that are here in issue, so that the right of Simmons to have this patent is now being contested by a suit. That is all I intend to show. I don't intend to bring in all the testimony that Edwards might bring in in that Washington, D. C., suit.

The Court: Well, that is the situation, is it?

Mr. L. S. Lyon: How can counsel go so far afield and claim that that is admissible, the fact that Edwards filed that suit in the District of Columbia after he had lost in the Patent Office, and we be denied the right to bring in the [fol. 212] Texas record, where that very issue was decided by the Texas court since Edwards filed that suit in the District of Columbia? Counsel objected the other day to our bringing in the decision from the Texas case, and now he wants to bring in here, not a decision, but the fact that a bill of complaint has been filed.

The Court: Is that decision final in Texas?

Mr. L. S. Lyon: It is final so far as the District Court is concerned in Texas.

Mr. Boyken: There was an interlocutory decree filed there. That was a different issue altogether than the issue in this case.

The Court: What are the pleadings here on behalf of Edwards?

Mr. Boyken: He is not a party to this case.

The Court: He is not a party to this case?

Mr. Boyken: He is not a party to this case, but he has been pleaded in the answer as a prior inventor.

Mr. L. S. Lyon: I contend that the fact that he filed that suit after he lost in the Patent Office is not admissible here at all.

The Court: I would think that is irrelevant matter here, the fact that he may have filed a suit somewhere setting forth the same claims that are set forth here, that the defendant here sets forth. That is all it amounts to, isn't it?

Mr. Boyken: That the plaintiff.

The Court: In other words, it is a showing that Edwards, in his own right, begins a suit in the District of Columbia wherein he asserts in his own behalf and for his own benefit that what the defendant asserts here is true?

[fol. 213] Mr. Boyken: I don't think it is quite that way, your Honor.

The Court: Well, he not being a party to the present action, the ruling will be that the evidence relative to the suit in the District of Columbia is inadmissible. So ordered. An exception to the defendant. Go ahead.

By Mr. Boyken:

Q. I understood in your direct testimony that you said that you are also in the oil well cementing business?
A. Yes.
Q. And these stations that you maintain, do they also render service with respect to oil well cementing as well as testing?
A. With the exception of in California.
Q. How is the situation in California?
A. I have a licensee under my cementing patent in California.
Q. What proportion of your business here in California relates to oil well cementing, as against oil well testing?
A. Well, we sell special cementing equipment, multiple stage cementing devices, and full hole cementing devices, and cement lined screen pipe, and measuring devices, and other oil field tools which the Halliburton Oil Well Cementing Company manufactures.
Q. The question is, what proportion is testing and what proportion is oil well cementing and tools?
A. Well——

Mr. L. S. Lyon: He doesn't do any oil well cementing in California.

[fol. 214] Mr. Boyken: I am trying to find out what the fact is.

A. We don't cement wells here, only through our licensee.

The Court: Answer the question, Mr. Halliburton.

A. We are not actually engaged in contracting and cementing of wells in California.

By Mr. Boyken:

Q. You only do testing here in California?
A. Yes, and the sale of supplies which we manufacture.
Q. You stated yesterday, I believe, that you charged $200 for a test?
A. Yes.
Q. Have you always charged $200 for a test?

A. We have varied the price, depending on the kind of job. We just recently established a fixed price, rental price, for our tool, regardless of the type or kind of test.

Q. And that is $200?

A. Yes.

Q. When was that price established? You said just recently.

A. It became effective here on November 1st.

Q. Prior to that time what was the charge?

A. I believe for certain types of tests we made a rental charge of $200, and for certain other types of tests we made a rental charge of $150, or $160 less a $10 discount.

[fol. 215] Q. So that recently the price was raised and standardized?

A. Yes.

Q. You mentioned some 7500 tests. Can you tell us about how many of those were made in California?

A. No, I couldn't tell you just about how many were made in California. Of course most of them were made outside of the State of California.

Q. What would be your estimate as to the number of tests that were made here in California since you first commenced to operate here?

A. Well, it would be a wild guess. I guess perhaps 500 tests, or maybe more or less.

Q. About 500 tests?

A. Yes.

Q. Of the approximate 500 tests, how many were formation tests and how many water shut-off tests?

A. I think about 65 per cent of them have been formation tests and about 35 per cent water tests.

Q. With respect to the Simmons patent here in litigation, I understand your position to be that you are of the opinion that the Simmons patent covers any kind of a valve that might be used?

Mr. Richmond: I object to that question as indefinite, your Honor.

A. Any kind of a valve associated with what other elements?

By Mr. Boyken:

Q. I understand your position to be that the Simmons patent in suit here covers any kind of a valve that may be

[fol. 216] used in connection with the other elements of the patent. Is that correct?

A. Any valve that would operate to positively open and close, to admit a sample.

Q. Well, is this Simmons patent limited to certain valves, in your opinion, or not limited to any certain valves?

A. It is not limited to any certain valve.

Q. It is not limited to any certain valve?

A. No.

Q. In your opinion is the Simmons patent here in suit limited to any particular kind of drill pipe or casing?

A. No.

Q. Any particular kind of packer?

A. No.

Q. Is it limited to any particular kind of fluid which is adapted to flow through the device?

A. No.

Q. And it doesn't make any difference whether it is a flow test or just an ordinary test where the fluid does not flow over the top?

A. Any test that will come within the claims of the patent will infringe, and any apparatus that comes within the apparatus claims will infringe.

Q. Do you feel that your "J" tool described here today also comes within the description of the Simmons patent?

A. It is embodied in the Simmons patent, yes.

Q. And you consider those valves that are shown in the "J" tool to be valves that are included in the Simmons patent?

[fol. 217] A. The Simmons patent doesn't specify any particular valve.

Q. It shows one kind of a valve, though, doesn't it?

A. Yes, but the claim doesn't necessarily call for any particular kind of a valve, as the patent itself states.

Q. I am not asking you that. I am asking you if it shows any particular kind of a valve.

Mr. L. S. Lyon: That word "shows"—I think the witness is entitled to state what he means by his answer.

The Court: Well, whether it shows any particular kind of valve, I would say that it does.

The Witness: The drawing shows——

The Court: Just a moment. It shows a particular kind of valve, concerning which I think I opened the proceedings

today with an inquiry as to just what the valve was. The Simmons patent shows that valve to the exclusion of any other kind of valve. It doesn't claim that valve, however, to the exclusion of others.

Mr. L. S. Lyon: And the patent expressly states that it contemplates the use of other substituted valves.

The Court: Yes, that is true. However, the witness may be fully examined regarding the valve that is shown in the patent.

Mr. Boyken: I don't intend to go over that again, your Honor. I just want to get the simple question whether the patent shows and describes any particular kind of valve.

A. It shows one type of valve that may be used with the Simmons invention.

Q. In your opinion does it make any difference what the fluid is in the well?

A. No, it doesn't make any difference what the fluid is.

[fol. 218] Redirect examination.

By Mr. L. S. Lyon:

Q. You referred on cross-examination to the various packers shown on Exhibit C, which included a wall packer and an anchor packer and a "rat-hole" packer. Were each of those types of packers in common use in the oil fields prior to 1926?

A. I never saw a cone packer prior to that time but the anchor packer and the hook wall packer and many other types of packers were used prior to that time.

Q. And operated just as you show them to be operated in Exhibit C?

A. Yes; and in other ways, too.

Q. In other words, in following the directions of the Simmons patent to use a packer, in using the kind shown in Exhibit C or the anchor packer and the hook wall packer, you were using types of packers that were commonly used prior to the making of the Simmons invention in 1926, is that correct?

A. Yes.

Mr. L. S. Lyon: The plaintiffs rest, your Honor.

The Court: So far as the infringement goes, Mr. Lyon, you are depending upon the interrogatories to show that, is that correct?

Mr. L. S. Lyon: Yes, your Honor. The defendants, and I think Mr. Boyken will confirm that, admit the use of the tools and the methods described in the answers to the interrogatories.

Mr. Boyken: Yes. There is no question about that, your Honor. And when we present our case we will fully show the structure and mode of operation of the accused device. We have a good model that will show the complete operation of what is alleged to be an infringement.

[fol. 219] FRANK E. O'NEILL, called as a witness on behalf of defendants, being first duly sworn, testified as follows:

My name is Frank E. O'Neill. I reside in Glendale, California. I have lived around the Los Angeles Basin since about 1927. I am by business or profession a petroleum engineer, and at the present time am secretary and treasurer of the M. O. Johnston Oil Field Service Corporation, one of the defendants herein. I have been connected with that corporation since March, 1933. Prior to March, 1933, I was doing petroleum engineering work in the oil fields from the time I left college in 1920 and practically up to 1933 for the Pacific Oil Company, the Pan American Petroleum Company, the Petroleum Securities Company and the Superior Oil Company, and I was on a tax research bureau for the State of California for a short time, and other just temporary jobs until I went into this work with Mr. Johnston. The character and nature of my work with these various oil concerns was primarily, field engineering work, following the drilling of wells and picking out shut-off points, places where we should cement casing and keeping track of the cores, with the idea of picking out the finishing point of a well so that we might keep out of water; general petroleum engineering work with drilling and development.

I have an A. B. degree from the University of Richmond in Virginia. Then I went to the Colorado School of Mines and stayed there until the war broke out. I was there two years. Then, while I was in the service, I had the opportunity of attending Cambridge University in England for a matter of one term. Then I came back and graduated

[fol. 220] from the University of California in petroleum engineering.

When I went to work in March, 1933, for the M. O. Johnston Oil Fields Service Corporation, one of the defendants herein, that company was engaged in the business of testing drilling wells and making shut-off tests and making formation tests, and the company has continued in that line of work to the present time. Upon my coming in contact with the work of M. O. Johnston Oil Field Service Corporation, that organization was very small and my part was to try to get some business and if necessary to run the tools, which was necessary many times; my part was to try to sell business and then help do the work also. I have actually made tests with the Johnston formation tester, and also shut-off tests and casing tests; I would say approximately a hundred tests altogether. All of these tests made by me were made in the state of California. The defendant Johnston Company in this suit does not at the present time operate outside of the state of California. For a short period of time in 1935 the company operated in New Mexico and West Texas, but after the decision in the Texas suit the company moved out of that territory and brought its tools back to California. The Johnston Corporation only made 20 or 25 tests in New Mexico and West Texas during its operations there.

I am familiar with the so-called Johnston device which has been heretofore adverted to in this trial. I have been familiar with it ever since I first went to work with the defendant Johnston Corporation. I have stated that I have run the Johnston device both in formation and in shut-off tests. I think I am familiar with the conditions which ordi-[fol. 221] narily exist in the oil fields where testing for the purpose of determining whether or not a formation exists from which oil, gas or other substances may be derived. In drilling an oil well by the present best known method, known as the rotary system, the first thing is to put up a derrick to drill with, and the machinery is handled with high-powered steam engines. A string of drill pipe, which is hollow, is provided, and a bit, used to drill with, is placed on the bottom of the drill pipe. The member at the top of the pipe is square instead of round, and that is what is used to rotate the drill pipe to bore the hole with. While that is going on the mud pumps are on the derrick floor and pump mud down through the inside of the drill pipe, out through

the bit, and that brings the mud up, brings it up to get rid of the cuttings, and the mud is then pumped back into the well again. A driller determines whether or not he has reached a stratum, which in his opinion should be tested, in different ways. There are various types of formation, like sticky clays, sticky shales, and then there are hard sands and hard shells, which drill differently. The driller can tell frequently from that that he has had a change of formation. He may take samples from the ditch where the mud drops the cuttings out. Another way to determine the formation is to use core barrels that are run on the bottom of the drill pipe in the place of an actual drilling bit. That core barrel goes down the hole, and it is rotated just as though it were a bit, and it cuts out a round area straight through the formation, a sort of biscuit arrangement, and that is brought out, and you can look at the various formations and, by a study of those core samples, and of the ditch samples, and the way that the formation drills, how badly [fol. 222] a bit is cut—one formation will cut it down worse than others, wear it down more than others—sand wears them very badly—and from a study of those we get some idea as to whether a test would be warranted on the formation that they are drilling in at the time. These evidences which I have spoken about in themselves do not determine the productivity of a particular formation. They simply give evidence which will enable the driller to determine whether or not a test should be made.

I am familiar with the conditions existing prior to the time when formation testers of the type and character that have been spoken of here were introduced. I was acquainted with the prior method of testing formations by bailing. When I came to the Johnston Company, defendant herein, that company had the present devices that they are now using for testing formations and for making water shut-offs. In describing the Johnston device that is shown on the particular diagrammatic chart on the easel, I will state that this is a diagram of the Johnston tool, carrying a packer on the bottom. The first diagram at the left bears the caption, "Going in." That merely shows diagrammatically the position that the valves are in when the tool is being lowered into the hole. The device is attached to the end of the drill pipe; I mean the drill pipe which is ordinarily used up to the time of the test, in drilling the well. The bit is taken off of the drill pipe and the testing

device screwed onto the end of the drill pipe. The drill pipe in the first place is handled by pulleys; we call them traveling blocks, and crown pulleys, in the top of the derrick. The drill pipe is standing back in the derrick. An elevator clamps onto a stand of pipe, which is about 90 feet long, [fol. 223] and the driller picks that up and swings it over the hole and screws it into the tool, or whatever article is going to be used, it is lowered away, and then another stand of pipe is picked up with the elevator and attached to the stand which has just been lowered into the hole. By stands of pipe I mean the usual lengths in which the drill pipe is unscrewed in coming out of the well, which is commonly about 90 feet long. Each stand is added to the other and lowered down into the well slowly through the drilling fluid. Drilling fluid is ordinarily what is known as rotary mud, a slick mud. It is supposed to have something similar to a plastering quality, to hold the walls of the hole up, and somewhat of a lubricating quality, and to be free from sand or particles which would settle down around the pipe and tend to freeze it or stick it in the hole; and when I say "freeze" it, that is the word that is used in the oil fields for sticking a tool in the well. The device attached to the end of the drill pipe is lowered into the well through this fluid or mud. It descends slowly. It is lowered by means of the equipment that I have mentioned, the blocks, and it is lowered reasonably slowly. It is put in fairly fast, though. While being lowered into the well the drill pipe which is located above the device is ordinarily empty. On some occasions fluid, a certain amount, is run in by the pipe.

Describing the Johnston tool, beginning with the top of the device immediately under the drill pipe, the tool is composed of a series of valves. The first valve is known as the trip valve, and as the tools are being made up to go into the hole, where they are going to run the drill stem completely dry, the trip valve is screwed onto the bottom of the [fol. 224] drill pipe. The device that is handed me is the trip valve and the main valve together and the connecting collar that screws onto the drill pipe. This trip valve element is composed of that ball which seats on the seat in the containing member. The trip valve is composed of several portions. a sort of a core here that has these balls set into it, and a sleeve that goes over, and then a plunger with holes through it goes in, and that is part of the plunger there, the

large portion of it that pushes the balls out; and the retaining sleeve is let down on top of the ball and takes a friction hold on the end of the plunger. The retaining sleeve carries a thread, which is threaded into the inside of the encasing member, and with a friction hold against the balls, a retaining portion which holds the plunger in position, which entire member is screwed down by means of the retaining sleeve until the valve ball is seated upon the seat below there in the encasing member. The purpose of the so-called trip valve is as follows: The trip valve cannot be opened by movement of the pipe or by setting the pipe down on a tight place in the hole, that is, a portion of the well that might have been drilled with a bit that was worn out of gage, which would give a narrower, smaller diameter, what we call a tight spot, in the well. If, in running the tool into the well the packer, which we will discuss in a moment, strikes a tight spot or portion of the well which has become bridged over by virtue of the walls caving to a certain extent, it would have no effect on the trip valve. The trip valve is closed before the tool is run in, and can only be opened by an impact from above onto this plunger. The valve which first opens in the device is the main valve. The main valve is shown in the portion of the device which [fol. 225] has been handed to me. That portion of the device which carries the trip valve and the main valve is attached to the other portion of the device which carries the packer and is attached to the end of the drill pipe and is lowered into the well. The purpose of the packer is to seal off the drilling fluid which will be above the point that it is desired to test, in such a manner that the hydrostatic head or pressure of that drilling fluid will not be exerted upon the formation to be tested, and will not dilute the material, the sample, to be taken from the formation. The particular type of packer which is attached to the device which I have before me is known as a "rat-hole" packer. The reason this type of packer is called a "rat-hole" packer is that in drilling, where production is expected to be encountered, the diameter of the well hole is normally reduced. In drilling an oil well, a rather large diameter hole is carried down to a point near where production is expected to be encountered. From that point on a core barrel, probably, or perhaps a small bit is used to drill a small hole down in the center and continue down small until something is found

that is sought to be tested. Normally this smaller hole will be drilled down a couple of hundred feet, and then begin to ream down and bring the larger hole down, and then go ahead with the small hole again and run that down further, and ream it down with a larger bit. Drillers don't like to get too much small hole ahead. It is a little bit bad in case something should happen. The "rat-hole" is the small hole below the large hole. The purpose of making the smaller hole is that it gives a shoulder at the junction of the two holes, a shoulder there, on which to set the packer, or, if casing is going to be set, a shoulder would be required to [fol. 226] set the casing on. It provides a sort of an offset shoulder or saddle. The top of the packer on the testing device is larger than the small hole. This "rat-hole" packer is shown in conical form, being smaller at the bottom than it is at the top, and when placed in the well sets in the top of the small hole. In other words, normally that shoulder is prepared with a reamer so that it will have just about the same taper as the packer. The packer goes down into the "rat-hole", jamming its way into the hole, until it is forcibly seated against it. The purpose of this particular type of packer is that in making a formation test, to shut off the drilling fluid above and any other fluid above the point to be tested, and to make certain that none of the fluid from above can get down into the "rat-hole" where the formation lies. When the packer is lowered into the seat on top of the "rat-hole", then the weight is let down on the packer to press it down on the shoulder, and that may be done several times; it will be spudded down; for instance, the weight will be let down and then picked up, and let down, to work the mud out from under the packer, to get a complete seal. I can illustrate better the seating of the packer upon the "rat-hole" by using this wooden affair, the "rat-hole" being evidenced by one of these apertures in this wooden affair; so that the weight of the drill pipe above it, which extends all the way to the surface, is let down on this packer and presses it down, and then it is worked some to get it down further. And every time that the device is let down, the main valve in the tool opens, by virtue of the compression of this spring and pushing that mandrel through there, that valve comes down off of the [fol. 227] seat by compressing this spring. The opening of this valve permits the fluid to rise past this valve, up to the trip valve.

By the Court:

Q. What fluid?

A. The fluid below the shoulder that we want to test, the fluid in the "rat-hole" below the shoulder, and that will come into the drill pipe, at least up as far as the trip valve.

By Mr. Morgan:

Q. Wait a moment there. When you lower the device into the "rat-hole" and the packer is seated at the top of the formation or "rat-hole," does the fluid which is in the formation, together with what mud there may be there, rise immediately up to the point of this valve which you have just referred to?

A. Up to the trip valve?

Q. No. That is not——

A. Not until this valve here is opened.

Q. But that main valve opens immediately that the seat is made?

A. When you seat this down on the shoulder and give it the necessary weight, it compresses this spring, this mandrel moves down, it pushes the valve down off of the seat, and that permits the fluid that is below here in the "rat-hole" to come through these perforations, up through the packer, up through the equalizing valve, which I will explain to you later, on through this valve, to this point where the trip valve is connected to the string of drill pipe.

When the packer is seated immediately on the top of the formation area, the top of the "rat-hole", the weight of the pipe above the main spring shown here compresses that spring, opens the valve, and the fluid is admitted from the perforated area, the formation area, up through [fol. 228] the packer, through the main valve, which is being held open by this spring and the weight of the pipe, and then up to where the trip valve is located. During all of that time the trip valve remains closed. The trip valve is not opened by reason of any movement of the pipe whatsoever; and by that I mean any movement of the drill pipe. The drill pipe is not rotated to open the trip valve, and the pressure or movement of the pipe vertically does not open the trip valve. No movement of the pipe opens the trip valve. When the main valve is opened by the weight upon the spring and the compression of the spring, the

liquid from the formation rises up to where the trip valve is located, and stops there. To get the material from the formation area, the fluid from the formation area, by the water, gas, or whatever it may be, oil, up into the trip valve and through the trip valve into the drill pipe which is to entrap a sample, is accomplished by dropping an iron rod through the empty drill pipe and striking this plunger on top. The rod is dropped from the surface. This rod is known in the trade as a go-devil, and it consists of a rod about 30 inches long; and it weighs 6 to 8 pounds. The rod strikes the trip valve with great force by reason of its dropping several thousand feet. When the rod hits this plunger it knocks this plunger past this retaining portion which I pointed out. Those balls drop into the recess that is in that plunger, and that releases the friction hold on the trip valve, and the spring underneath the trip valve lifts it off of the seat, allowing the fluid to pass through and on into the drill pipe. It is done this way. The trip valve remains open until the device is withdrawn from the well, and it has to be set by hand before it will close again. It has a retaining dog above it here which [fol. 229] pops out and holds it so it won't go down again unless it is pressed in so it can be pushed down.

The Court: That means bringing it to the surface in order to set it again?

A. To close that trip valve again, yes.

The Court: It remains open until it is brought to the surface?

A. Yes.

There is no other means of closing the trip valve once it is opened. There is no other means of opening the trip valve so as to admit the fluid up into the drill pipe other than by dropping this iron bar called a go-devil. It has to be hit from above. When the trip valve is opened the fluid comes up from the formation, past the main valve, which is open by reason of the weight of the pipe compressing that spring and keeping that valve open, and then it passes up through the opened trip valve, and on into the drill pipe. The length of time that the device is left in the well, with both the trip valve and main valve open, depends largely on the amount of blow from the drill pipe. and by the blow I mean that the fluid entering the bottom of the drill pipe, which contains air, exhausts

the air there at the top of the drill pipe, causing a blow, which can be noticed very definitely if a wet cloth is laid over the top of the pipe; it will cause the clothe to bulge up and possibly wave as it lifts up.

Q. Now, Mr. O'Neill, is it possible to make a test of the formation area for the purpose of determining whether or not there is gas or oil there by a direct flow through these two open valves up to the mouth of the well?

A. You mean with the packer set?

[fol. 230] Q. With the packer set on the seat.

A. Yes. Wells do at times flow straight through.

Q. So that you make a test by direct flow up and over the top of the drill pipe at the surface?

A. Yes. When that is done you usually have some control on top of the drill pipe, so that the fluid can be turned into a tank or sump hole or something, but it flows straight on through. If there is sufficient pressure in the formation being tested to lift the fluid that far it will bring it right on through.

If there is not sufficient pressure from the formation to force the oil up through the entire drill pipe to the surface, a sample is entrapped by raising up on the drill pipe and releasing the compressive strain on this main valve spring. This main valve has been kept open up to this time by the weight of the drill pipe and also the force of the spring. As soon as sufficient weight has been lifted off of this spring to permit the spring to actuate, the spring closes the valve. The drill pipe is picked up very slowly, but the valve closes with considerable snap. The reason why the valve closes with a snap is the action of this spring. It closes with enough of a snap that it frequently may be felt at the surface on the pipe in the way of a vibration. Even though the pipe is being picked up very slowly, the valve closes rapidly, and that is the action of the main spring. When the drill pipe is raised at the surface, relieving the pressure upon this spring which is holding the valve open, the valve then closes by reason of the spring forcing the valve closed, if the pressure of the pipe is removed. The closing of the valve traps the sample in the drill pipe; by simply pulling the device out of the well, bring the sample to the surface. In the opera-
[fol. 231] tion of the tester, neither the trip valve nor the

main valve are opened or closed by a rotary movement of the drill pipe. The main valve opens by lowering the drill pipe into the "rat-hole" with the device attached and compressing this spring and causing this mandrel to move through here and the valve to come off the seat there to allow the fluid to pass through the valve. The valve is closed when it is here. The valve seat is screwed into this. So that when the drill pipe is set down on it, it compresses the spring and lifts this valve off the seat, and the fluid passes through those holes and through the mandrel and on up to this trip valve. This is as far as it can go until the trip valve is opened by dropping a weight and striking this plunger.

I have never operated or used any one of the various Halliburton devices or the Simmons device. I have seen models of them. I have looked over models of them, but I have never had anything to do with the full workable size devices. I have seen, however, complete models, containing all of the various elements, valves and other adjuncts. I have seen drawings of the Simmons device, also drawings of the stop cock and gear device and the "J" slot device. I am referring to models and drawings that have been produced here and in the Texas case. I have also seen the specifications and the drawings and all of the disclosures in relation to them. The original Simmons device does not have a valve or equivalent of a valve for performing the same functions as a trip valve. The stop cock and gear device put out by Mr. Halliburton or his company does not have a valve similar to the trip valve or its equivalent, or perform any of the same functions as the trip valve in the Johnston device. That is also true [fol. 232] of the "J" slot device. The reason the trip valve was placed in the Johnston device, and the purpose it serves and the conditions it meets, is, as I said a moment ago, the trip valve remains closed until it is opened by dropping a rod from the surface, regardless of what obstruction may be encountered by the pipe or packer going into the hole. Up to the time the trip valve is opened by the dropping of the go-devil and its contact with the trip valve, no portion of the fluid from the formation area can get up into the drill pipe. The trip valve is a seal blocking out any fluid inside from passing on into the drill pipe until such time as that valve is opened. The main valve may open accidentally going into the well, from obstructions

or from running it in a little too fast or the mud being a little too heavy, which would cause the resistance of the packer passing down to be sufficient so that the weight of the pipe down on that would compress that spring.

Mr. Morgan: If your Honor pleases, we have brought into court a model of an oil well and a full-sized Johnston device, which we think will greatly facilitate matters in the giving of testimony and in the explaining of the functions of the device. With your Honor's permission, I will ask Mr. O'Neill to step down to the oil well model which is here shown.

Q. Mr. O'Neill, directing your attention to this glass model set upon a wooden and metallic base, I will ask you to state what that is.

A. That is a model constructed to represent an oil well. Here we have a metal container which would represent the reservoir in the ground. In that we have water with [fol. 233] anilin dye, colored red, to represent the fluid contained in the earth, in the reservoir.

Q. That fluid may be either water, gas or oil?

A. Yes. Then inside of this tube here we show a smaller tube containing that red fluid. That tube is supposed to represent the reduced bore of the hole we referred to as a "rat-hole." Above that we have this metal tapered shoulder, which represents the shoulder in the well. Above that we have the full-sized glass tube which represents the full bore of the well, the portion of the well that is made with the full-sized bit. In this we have a mineral oil, something that would represent the drilling fluid.

Q. That is the rotary mud?

A. That would be the rotary mud in the case of a well; yes.

Q. What does the glass casing there represent?

A. This would represent the walls of the well. We understand, of course, that the walls of the well would never be as smooth as this glass but it was made of glass so we might see through it and see the model go into that fluid.

Q. The glass represents the earth wall?

A. The earth wall of the well.

Q. And not the casing which is later put in when the well is put upon production?

A. That is right.

Q. Will you point out to the court where the packer is seated when the test is being made?

A. The packer is seated upon this shoulder This model only shows the use of a shoulder packer or tapered "rat-hole" packer. Other types of packers would pack off [fol. 234] against the side walls but this one is constructed to demonstrate a tapered packer. That seat is made of metal because we were afraid that glass might break.

Q. Have we a device which is of a size sufficient to make a test in that particular model of the well?

A. Yes, sir.

My attention is now called to a Johnston device lying on the floor, which has been broken up into its component parts. I will start at the lower end of the device, explaining each feature. This piece of pipe with the slots or perforations in it, and welded together at the bottom, is known as the anchor. That screws into the bottom of the packer. It is sometimes spoken of as a perforated nipple. The primary function of this perforated nipple is to prevent large particles entering the tool that might plug up some of the reduced passages through the tool. The fluid enters through that. That, primarily, though, is to screen particles from the fluid which enters. The fluid enters through these perforations. After entering the perforations, the fluid passes through the packer and comes on up through the mandrel and tube and the equalizing valve, on up to the main valve, which would be open when the packer is seated, with the weight set upon it, and then through the main valve it comes on up to the trip valve.

The type of packer which is here before me, and which I have been referring to, is a "rat-hole" packer or conical packer or tapered packer. It is intended to seat into the entrance to the "rat-hole" and to seal off the fluid above from the formation below.

The member which is next above the packer is a member that screws into the top of the packer. It forms a bottom portion of the equalizing valve. The equalizing valve has [fol. 235] the function of, after the test is completed and before the packer is lifted off of that metal seat, letting the fluid, which is resting above the packer here, and which in a deep well might have a very high hydrostatic head on it—for instance, if this packer was set at 6,000 feet, the hydrostatic head down on top of this packer would be approximately 3,000 pounds to the square inch. As we take fluid up from under the packer out of the "rat-hole" and

bring it through, the pressure below the packer might be reduced, depending upon how much pressure there was in the formation we were testing. In that case I have reduced the pressure below. I have the constant hydrostatic head above, extending all the way to the surface between the walls of the well and the tool and drill pipe. And, as the pressure below is reduced, that would cause the packer to seat more firmly down into the top of the "rat-hole", just as though I had a cork in a bottle and I exhausted the air from the bottle to a certain extent. Then the cork would seat tighter. When we are through the test and we want to pull that packer off of the seat, that additional difference in pressure, caused by removing fluid from beneath the packer while the column on top of the packer remains constant, makes it necessary to put a great deal more strain of a pull on the drill pipe. That we found became dangerous, with the possibility of pulling the drill pipe in two. So this valve, constructed to relieve that pressure, has a mandrel with holes in here. It has a packing gland here. The packing goes in here. The packing has no relation to the packer we have heretofore been describing. It is like this. It packs off between the mandrel and the walls of the tool, to prevent leakage. It is packed in there and screwed [fol. 236] down with this nut. This goes in the bottom here as the bottom member. As the pipe is picked up, or while the packer is seated on the seat, this is down and the holes that we saw in the mandrel are below the packing. When the pipe is picked up, those holes are pulled up to where they match the holes through this hollow nut, so that the fluid on top of the packer may pass through these holes and down through this equalizing valve, through the packer and out through the perforations and into the "rat-hole" below the packer.

(The witness, in answer to questions by the Court, stated:)

These holes here—when the packer is seated the pressure is down. The packing gland sets in here. I describe it as an equalizer, to equalize the pressure above the packer with that below it. The fluid above is immediately in contact with the outside of this member here, the drilling fluid that is setting above the packer. For instance, here would be the walls of the well, and here is the tool. That whole space is filled with drilling fluid resting on here.

The problem is to allow some of the fluid immediately in contact with this member to get down into the place from which the sample has been withdrawn, without mixing with the sample. That is done in the following manner: When we are ready to let that fluid down we just raise up on the drill pipe, hoist it on up, and this mandrel slides. We only hoist it up far enough for this to open. The drill pipe is not detached from the packing. The mandrel slides inside of it this way so that when I pick up all that moves is this mandrel. When the drill pipe is lifted up the holes in the mandrel are pulled through a packing gland here and above [fol. 237] the packing, and then those holes are opposite the holes that are in here. These holes go all the way through. The fluid goes through these holes on the inside of this pipe. These holes do not enter into the place where the sample is contained. The sample is trapped above the valve, it having already gone up above the valve. It is clear out of the way. Then the fluid passes through here and through the inside of this, down and out through the perforations and into the "rat-hole," giving about the same pressure below the packer as that above it.

(The witness, in answer to further questions by Mr. Morgan, stated:)

That will enable the packer to be lifted from the "rat-hole" more readily; it makes it much easier to lift from the "rat-hole". Otherwise it might stick. It might entail a sufficient pull upon the drill pipe to damage the equipment and possibly to pull the drill pipe in two or to disrupt some of the equipment.

The next member is what we call the head of the equalizing valve. It screws onto the mandrel of the equalizing valve. That is the mandrel. And it serves two purposes. One is that it has threads here to which the main valve is attached, and it has a sufficient recess in here to allow the main valve to come down and open into that recess.

The next member we come to is the circulating valve. In wells where we are drilling the fluid is circulated down inside of the drill pipe and up the outside and around to a ditch constructed for the purpose of carrying that fluid back to a tank, where the pumps pick it up and pump it back into the drill pipe and down the well. It just con- [fol. 238] tinues that circulation. That fluid brings the sand and bits of shale, cuttings and things of the kind, to the

surface and deposits them in this ditch and tank; and the fluid, having dropped its load of cuttings, is picked up by the pumps and pumped back down through the drill pipe and up between the drill pipe and the walls of the well and back into the ditch again. This valve, known as the circulating valve, is used only in an emergency. When a packer is set on the seat and becomes very tight, so that we have grave difficulty in loosening it, we may pump fluid down through this tool and out through this valve, which is a back-pressure valve or check valve. The main valve has a hole through it, and the seat of the circulating valve is attached to the bottom of the main valve. The opening is closed by a ball here held in place by a spring encased in what is called in the oil fields a cage. This valve will permit fluid to pass through it from the inside of the drill pipe to the outside, but not from the outside to the inside.

Q. What is the purpose, or what is the emergency which calls upon the operator to use that particular circulating valve, and will you explain how it is done?

A. When, as I said a moment ago, a packer becomes tight, fluid may be pumped down through it and pressure built up with the pump beneath the packer, or it may be turned loose through these holes in the equalizing valve, and any debris that has settled upon the packer washed out that way. That is one of the uses. Another use is that sometimes in testing a well which has a very high pressure in the sand being tested, and the packing is lifted off of the seat and the tool started out of the hole, perhaps there have been four or five stands of drill pipe unscrewed and set back into the derrick, and the well decides it is going [fol. 239] to flow. In other words, the gas pressure in the sand has bubbled up into the mud and whipped the mud until the mud is much lighter than it originally was and the pressure in the sand thereby overcomes the hydrostatic head against the sand, and the well starts to flow. Unless some method of controlling that flow is had the well will go what we term in the oil fields wild; it will blow out.

It is difficult to say definitely what would happen if the well was allowed to blow out, but it might completely ruin the well. It might completely cut the derrick down, by virtue of the debris blown from the hole. In any case, it would be extremely undesirable and probably expensive. To overcome the possibility of blow-outs, this valve, the

circulating valve, makes it possible to pump fresh mud right through the drill pipe without going back to bottom to seat the packer or to open any valve, just to hook the pump onto the top of the drill pipe and circulate through it at any place in the well that trouble arises. In other words, to pump in enough drilling fluid or mud to overcome the pressure of the blow-out. Mud is pumped in that is not whipped up by gas, clean, fresh mud, and when that mud is pumped through into the well it makes a much heavier ground against the sand than the ground that was there thoroughly gas-cut and whipped up. In order to restore circulation and prevent the blowing out of a well, it is not necessary to return the packer to its seat. It may be pumped through at any point, just hook the pump onto the top of the drill pipe, which is normally done by seating on top of the drill pipe what is known as a Kelly. That is a square member which is used for rotating the drill pipe. It has the hose from the pump hooked into [fol. 240] the top of it, and they set the Kelly on and screw it up and start the pump, and they pump right on through the drill pipe without going back to bottom or without going back to set the packer again. It is difficult to say what would happen if one had to wait until he had gone back and reset the packer before he could restore the circulation and prevent the blowout. If the flowout starts there is frequently not time to run the drill pipe back to bottom and seat the packer in order to prevent the blowout. When that has to be done the pipe frequently has to be run in with the well blowing right up through the rotary table where the men are working. If the blowout is of sufficient force it would be impossible for men to work there.

If the device of the Simmons patent has been seated on a shoulder, opened, completed a test and closed, and it is three or four hundred feet from bottom on its way out of the hole, it would have to be run back to bottom and set on the shoulder or set tight enough so that the lower member might be held stationary while the upper member would turn on it, in order to align the holes through the two valve sections, in order to let the fluid be pumped through, so it would be necessary to run that device back to bottom and set it in order to pump through it. That is because the Simmons device is opened by the relative movement of one of the valve members on the other. If the top member is to be turned, in case the member that is hooked

to the drill pipe would have to be turned, the lower member would have to be held stationary. If the lower member turned with the top member there would be no relative movement to align the parts, and the valve would not open.

[fol. 241] Q. If the blow-out occurred while the device was from three to four hundred feet above the "rat-hole", how long would it take before the Simmons device could be lowered again to the point where the packer would be seated firmly enough to enable you to rotate the pipe and to rotate the valve, and thus open the valve, so as to enable you to restore circulation?

A. That would be very difficult to answer. It would depend entirely on the strength of the blow-out. The average time required for running a stand of drill pipe would be approximately three minutes. Three or four stands of drill pipe run under good conditions would take at least ten or twelve minutes to get them down, to get the packer set and open the valve. Under the best of conditions, I would feel that I would be fair in saying fifteen minutes, and under conditions of a blow-out it might be any amount of time.

Q. And might it be entirely too long a period of time to enable you to prevent the blow-out from ruining the well?

A. It might well be.

The Simmons device has no value for the purpose of restoring circulation under the circumstances I have just enumerated. The Simmons device has no equalizing valve such as I have described to enable one to more readily pull the packer off the seat without destroying the device. By the Simmons device, I mean the original device, Plaintiffs' Exhibit No. 9. The stop cock and gear device of the Halliburton Company has no circulating valve or any means of restoring circulation other than by doing what I said was necessary to be done in relation to the original Simmons device. The stop-cock and gear device has no equal-[fol. 242] izing valve. Before putting the device together, I would like to show the main valve, which is attached to the circulating valve. One more remark on the circulating valve. I said that the circulating valve opens downward, which would permit fluid to pass from the inside of the drill pipe out, but not from the outside of the drill pipe in. That needs explanation, because anyone would think that a sample entrapped in the drill pipe would fall

out; but whatever the fluid that we take into the drill pipe it is normally lighter than the drilling fluid which we have outside of it, and even though the drill pipe filled up full with fluid from the "rat-hole", the column of fluid inside would be lighter than the fluid outside. Consequently this differential pressure from the hydrostatic head of the fluid would hold this ball against the seat and prevent the fluid leaking out, and it is made that way so it will prevent the drilling fluid leaking in. As we pull out of the well we would expect the fluid to drop in the well as this string of pipe is pulled from it. That is overcome by constantly pumping fluid into the well between the string of tools and the walls of the hole and keeping the hole full to the surface at all times when the tool is being removed from the hole. That gives you high hydrostatic pressure in a position to hold the ball against its seat, and that is furthermore considered a safe method in drilling wells whenever removing any type of tool from the well, to keep the well full of fluid.

Referring now to the third Halliburton device, known as the "J" slot device, this device has a means whereby circulation can be obtained in much the same manner, if not in the same manner entirely, as the Johnston device. The "J" slot device has back pressure valves which may [fol. 243] be pumped through, as this device may be pumped through. The "J" slot back pressure valves also trap the sample in the drill pipe. And I might say, with reference to pumping through these devices, that both of them, the "J" slot device and this device, when the drilling fluid is pumped through the drill pipe, the sample entrapped is pumped out through that valve into the drilling fluid in the well, destroying it for its useful purpose. The Johnston device has had the circulating valve, which I have described, as a part of its assembly before the Halliburton Company brought out the "J" slot device. The Johnston device has employed the circulating valve ever since I have been acquainted with the device.

The next member which I wish to explain is known as the main valve section. We have here the mandrel, which has a hole through it, and it goes through here. This is a packing ring. None of the valves of the Johnston device that I have mentioned so far open or close by a rotating movement of the valve or of the drill pipe. The packing goes in on that junk ring. This packing gland screws

in here and comes in deep enough so that this valve seat may screw in behind it, so the valve seat would screw right in on top of this packing gland. Then the valve, the main valve, screws into this mandrel. When that is pushed down off of this seat the main valve is opened, and the fluid passes here through those holes and on into the interior of this mandrel and up. This spring which controls this main valve is placed in there. This member, the head of the tool, the valve section, screws onto that mandrel here. Now, this thread screws into the top of the equalizing valve, and the action is, when the packer is seated and the weight of the drill pipe let down, this mandrel moves [fol. 244] like that, and this spring is compressed between this shoulder and this one, and this is what we call a tension nut, and it can be used to take up any amount of tension on this spring. Tension on that spring is offered normally according to the depth of the well. If that spring were compressed so far by the tension nut that these spaces were closed up completely then there would be no travel for the mandrel, so that the valve could come off of the seat, but the tension is not taken up that far. It is adjusted according to depth. When the packer is seated and the drill pipe weight let down, then this member goes down, this mandrel moves through here, compressing this spring, and this portion here moves down into this box at the top of the equalizing valve. That permits the fluid which has entered the perforated anchor at the "rat-hole" and passed through the packer and through the equalizing valve to enter this valve called the main valve and pass on up to this valve called the trip valve. The fluid can't go past the trip valve until the trip valve is opened. The impelling force or action that causes that spring to open the valve is the weight of the drill pipe let down upon it, with the packer seated, so that the portion that is screwed onto here can't go any further down. Then the weight of the drill pipe presses that spring and pushes that valve off the seat. The valve does not open, nor does the spring compress by any rotating of the drill pipe or of the valve. There is no rotating process involved in it at all. When the spring forces that valve open, the fluid comes up, passing through the member which we have here and up to where it is checked or stopped by the trip valve. When the test has been completed and it is wished to close the main valve of the Johnston device, [fol. 245] this closing is accomplished by lifting up on the

drill pipe and relieving a certain an t of compressive strain on that spring. The drill pipe is hoisted very slowly. And when sufficient weight has been removed from that spring, the spring actuates that valve and snaps it shut with a great deal more speed than the drill pipe is moving. I explain that this way: When the main valve shuts, frequently you can feel the vibration on the drill pipe at the surface, and the only explanation I have for it is that when you pick up a string of drill pipe there is some stretch in the pipe. For instance, with a string of pipe set at 5,000 feet, with the weight down on the packer, if you put a chalk mark on the drill pipe at the rotary table and pick up, that chalk mark would travel probably 15 inches or such a matter as that before the bottom of the pipe ever picked up. So there is a stretch in there. And when the weight on top of that string has been relieved sufficiently there is a considerable stretch in the pipe and the spring then actuates, and I believe it takes up a portion of that stretch. I can't explain it otherwise and I have thought about it a great deal. But, nevertheless, it happens. It might be due to some inertia in the metal of the spring. That is something, however, that I wouldn't feel qualified to discuss. Myself and others have experienced that snap which comes after the pipe is lifted very slowly and slightly, and I don't believe that the slow hoisting of that drill stem would pull the mandrel through against that valve with enough impact to cause any such violent snap. In closing the main valve there is no rotation of the drill pipe or of the valve involved. The valve is closed simply by the lifting of the drill pipe slightly and slowly, as I have stated, [fol. 246] and by reason of the action of the spring. In going into the hole, if we hit a tight place, the same thing will happen. If the packer runs into a tight spot and the weight of the drill pipe comes down on it, that spring will be compressed and the valve opened. But, if the packer succeeds in going on through the tight spot, so it doesn't have to be picked up, as soon as it gets through the spring snaps it shut again.

I will now explain the trip valve, its uses and purposes. This is the encasing member. It screws into the top of the tube of the main valve section. In here we have a seat which this ball sets down on, and that affects the seal when it is properly seated down on that ground seat. We have here a plunger with a recess in it. These retaining

balls are calked in so that the hole extends through and the edge of the ball will extend through the inside. When this is pushed through that large part hits the balls and pushes them out and this sleeve drops down on them, catches them in that position and holds them against a large part of this plunger with a friction hold. That then is put in here and screwed down. That retaining sleeve caught on top of the retaining balls carries the whole member down, compressing the spring as it is screwed down into the inside of this member, so that the ball comes to rest on a seat which is located down inside of here. That affects the seal. That valve is the entrance valve for the tool. Everything else is open in the string of tools and they are ready for the fluid to start from the "rat-hole" up into the drill pipe. And an iron rod is dropped in. It hits on the top of this plunger. It pushes the large part of that plunger past the retaining balls and the balls drop into the recess which I showed you in the plunger. That relieves the fric- [fol. 247] tion hold and the fluid pressure and spring together will lift that valve off of its seat and the valve is open. That allows the fluid to come on into the drill pipe. Up to the time that the trip valve is opened no fluid is allowed to come into the sample chamber or into the drill pipe which is the sample chamber. The fluid has been permitted to come to this seat in the trip valve, where this ball rests against the seat, and it stops there. It is held up by the trip valve and it is not permitted to pass until the trip valve has been opened. Up to that time the drilling fluid has been allowed to come up into the device through the valves that I have mentioned, through the main valve up to the trip valve but no further. No sample has been taken until the trip valve is opened. When the trip valve is opened, sampling commences. There might be a little bit of fluid between that main valve and that valve trapped. It would be some eight or ten feet of fluid, whatever it was, between the packer and the trip valve. Between the main valve and the trip valve——

The Court: Let the witness state what the necessity of the trip valve is.

A. We go into the well with the tools assembled. If the fluid is very heavy, if the driller runs the tool a little too fast or the hole has tight spots in it, which they frequently have, the packer would offer so much resistance to going

down through the fluid that the weight down upon it would open this main valve. If I didn't have this trip valve, the fluid would go right on into my drill pipe because my drill pipe is being run empty or partially empty. I mean the rotary mud, and not the fluid in the formation. The drilling fluid. We haven't reached the seat for the packer yet. [fol. 248] So that there would be fluid in the drill pipe when the packer reached the seat of the "rat-hole" and there would be no way of determining how much fluid there was or just exactly where it came from. With the trip valve in there the tool can hit a tight place in the well and push through and open the main valve and the main valve will close again just as soon as the tool goes through. But that doesn't affect the test, because the fluid is held out of the sample chamber by the trip valve. In lowering the device into a well, say a deep hole of five or six thousand feet, there may be obstructions on the road down which would cause the packer to be obstructed temporarily and the weight of the pipe above it might open the main valve and permit drilling fluid from above the "rat-hole" to enter into the device; it would permit drilling fluid to enter right into the drill pipe. If the main valve is open, the fluid would enter under those circumstances into the device; but with the trip valve closed the fluid could not come up any further than the trip valve. The purpose of the trip valve is to prevent an unknown amount of fluid to come in because at times operators want to run some fluid in the pipe and they are afraid maybe they will collapse their pipe, and in that case we put the tool on and, if they want to run a thousand feet of fluid, we put on a thousand feet of pipe, fill that up with fluid and then put the trip valve in on top of the fluid and we know how many feet of fluid is in there. I don't know that I have made it clear, but these "rat-hole" packers normally have a diameter within an inch of the inside diameter of the walls of the well. And that means that, if there is very much deviation in the hole, tight spots may be found frequently.

[fol. 249] The other function of the trip valve is, if we run a string of drill pipe on this tool, and the operator doesn't know it but he has, just the same, a leak in his drill pipe, then the drilling fluid that is in the well will leak in on top of the trip valve. With only the main valve there and no trip valve I might not know that. I might come out of the well and think, "Well, I have made a test." But with the

trip valve there I do know it because the iron rod that is dropped in to open the trip valve has the speed of it so reduced by any fluid on top of this member here that it doesn't hit this plunger with sufficient impact to open it. The result is I come out of the well with the tool and I find say a hundred or two hundred feet of fluid in my drill pipe and I break the tool down and find my trip valve is still closed. Now, if that trip valve has been opened, it has to be brought out to the surface to be closed. So I know it has not been opened and I know that that fluid didn't come through the trip valve. So it must have leaked in through the drill pipe above the valve. Then we hunt for the leak in the drill pipe, remove that, put in another piece of pipe and go back and make our test. If we didn't have this trip valve and there was a leak in the drill pipe above it, we would only know whether or not we had made a test of the formation area in cases where we got a definite fluid sample of water or oil or lots of gas. If we tested a formation which was negative, that is to say, which did not produce either oil or gas or water, and there was a leak in the pipe and we had no trip valve to enable us to determine whether or not there was a leak in the pipe, we would not be able to say that we had made a test. I would be in serious doubt [fol. 250] as to whether or not I had made a test. It would be uncertain. It would be a matter of doubt and would be undesirable. With this trip valve, if there is a leak, the mud fluid going into the drill pipe from outside the drill pipe in the well would come down to the trip valve and form a mass of fluid there through which this iron pipe which is dropped would not penetrate with sufficient force to open the trip valve. If the device is brought out with mud or fluid above the trip valve which was not open, you would know positively that no test had been made and that the fluid in there was due to a leakage and was not fluid coming from the formation, and I would be able to tell the well owner that no test had been made. I have had just such experience.

The valve which lies below the main spring, which we have been calling the main valve, does not alone operate so as to enable the fluid to enter the drill pipe which is the sample chamber. That valve only permits the fluid to come to the trip valve. Your trip valve is the valve that is the entrance valve to the sample chamber. The main valve is the valve that traps the sample in the chamber after it has

been admitted by the trip valve. The trip valve member screws into the top of the main valve section. There is a collar which goes on top of the trip valve, into which the drill pipe is screwed, so that the entire device may be lowered into the well. The trip valve is opened by dropping an iron or metal bar from the top of the well. The trip valve may be down four or five thousand feet or more. In order to demonstrate how this trip valve is opened by the go-devil, I would like to have it borne in mind that this trip valve has only been set by hand. In running the trip valve [fol. 251] in a well it is set up with a wrench and it takes a great deal more of a blow or an impact to open it in that case than it would in this case. But by tapping this plunger I can trip that valve, which is like it is tripped when we are ready for the sample to pass through into the sample chamber. If it were screwed up as it is in actual operation, it would require a much greater blow than it does in its present condition. The blow which I have just given the trip valve has opened it, and when it comes open this member slides out of this retaining sleeve and this spring member, which we call a dog, jumps out so it can't be closed. The fluid comes through this member and out through these holes. I mean the holes that are shown in the top of the trip valve plunger. I have removed the trip valve, and explain that the dog, in case one has to circulate through the tool, prevents the trip valve closing under pump pressure, so that it will remain open once it is opened. In other words, on withdrawing the device from the well, the trip valve cannot be closed. It closes manually. The thing that holds the sample up in the drill pipe is the closing of the main valve which I showed you. That traps the sample. The balls had a friction hold on the enlarged member there, and when I hit this plunger I knocked the enlarged portion of the plunger past the balls so that the balls dropped into the recess in the plunger. The marks may be seen on the end of the plunger where the balls slid along as the plunger was knocked past. After the balls are knocked into the recess, the valve opens. The friction is relieved and this member rises and the balls are up in this sleeve. Then the fluid com- [fol. 252] ing through the seat there enters here, comes through holes there and enters here, and out through the holes in the top of the plunger and on into the drill pipe sample chamber. There is no way of closing that trip valve

Neither the Simmons device nor the Halliburton stop cock and gear device, nor the Halliburton "J" slot device has any trip valve or its equivalent.

In operating one of those devices, should there be a leakage through the drill pipe above the device, there would be no way of determining whether or not the fluid found in the sample chamber came from the formation area, or whether it came in from a leak in the drill pipe, in operating those devices, except in the event that the fluid found in the drill pipe was definitely indicative itself. If it were salt water, oil or lots of gas, you would know that you had taken some fluid from the formation. However, you wouldn't know but what some fluid, if there were mud in there, had leaked in. If you were testing a formation which would ultimately turn out to be a formation where there was no gas, no water and no oil, in other words, where under a proper test the result would be negative, and you were using the Simmons device or the stop cock and gear device or the Halliburton "J" slot device, and a leak should develop in the drill pipe somewhere up and down the well above the device, you would not be able to determine whether or not you had made a test. In the use of the Johnston device you would be able to tell whether or not you had made a test. You would know that nothing had leaked in if you found that trip valve open because, if the fluid had leaked in on top of it, the blow would [fol. 253] not open the trip valve. If the trip valve is not open and there is fluid above it, I know there is a leak. It has happened once or twice in our work that the trip valve was seated a little too tight possibly; and it has happened also that subs, as we call them, in the string of drill pipe, which are so constructed that they have one sized thread on the bottom and another size on top in order to hook tools to different kinds of drill pipe, may have a shoulder inside and the go-devil would strike that and its force would be expended and it would drop down on the trip valve and not open it. But in that case you don't have any fluid above it. If we find the trip valve is closed and fluid above it, we know we have a leak. That is the only method I know of whereby a leak may be determined; I mean with accuracy. That general method would be the only way that I know of to determine a small leak in a drill pipe. The use of a brittle disk in there might

determine it. A brittle disk in place of the trip valve would not be as consistent in its operation. To explain that statement, I will state it is merely a disk set into a joint of pipe which will prevent the passage of fluid through, and of such a nature that a rod or an object dropped from the surface through the empty drill pipe will strike the disk and break it and allow the passage of the fluid there. It is not as consistent because with a brittle disk or a frangible disk the amount of pressure that is below the disk would vary in almost every well. Sometimes the fluid would be up against it with so much pressure that perhaps the blow would not break it. The same disk, with less pressure supporting it, would break readily. Again, if the disk is [fol. 254] too weak, the fluid pressure itself might break it. It is not as consistent in its operation as a trip valve. A brittle disk, I would say, if it operates, it should give you about the same information that the trip valve gives. Not to my knowledge have any of the Halliburton devices or the Simmons device anything in the nature of a brittle disk or any sort of a valve which operates as a brittle disk or as trip valve would operate. I have seen the models that have been introduced here. None of these models show a trip valve or the use of a brittle disk or anything of that nature.

Q. Mr. O'Neill, I want to call your attention back again to this model. Have you got a Johnston device in model form which will fit into the model glass well here which we have?

A. Yes. That one.

Mr. Morgan: Will you gentlemen come forward and assist Mr. O'Neill.

Q. I want you to place that model of the device into this model well and I will ask you, Mr. O'Neill, as it is being done to explain the operation and the different functions.

A. May I say that these two joints here are put on to represents joints of drill pipe. They have been cut away and glass inserted in there purely for the purpose of being able to see through there. That drill pipe does not have any such insertions in it. Then we have below here the trip valve and the main valve and the equalizing valve and the packer and the anchor, the perforated anchor.

[fol. 255] Q. Will you insert that device, together with the two model forms of drill pipe, into the well?

A. Let me state further in here——

Q. Have you anything there which will artificially supply what you might find in the formation in the way of pressure?

A. In the oil sands or the reservoirs we find some pressure. It varies. It might be very high or might be very low. That is a force which causes the fluid coming out of the reservoir to enter the drill pipe. Naturally, there is no natural force in this tank. So we have supplied a small pump here with which we can put a little pressure on here to cause that fluid to rise.

Q. In other words, that takes the place of the natural pressure which you find ordinarily in formations about to be tested?

A. It would represent that natural pressure.

Q. And you have a pump here which forces air in to take the place of that natural pressure?

A. Yes. There is a gage on the back to show the pounds and then there is a valve which will permit the pressure being bled off and allow the fluid to drop back down into that reservoir chamber.

Q. Will you supply some pressure there, please, below the opening into the "rat-hole"? That is sufficient. Now, will you proceed to put the device in?

A. We bleed that down so as to get the fluid down below the shoulder there.

Q. Now the device is going into the well, is that correct?

A. That is right.

[fol. 256] Q. It is now down in the drilling fluid?

A. Yes. It is passing through what represents the drilling fluid.

Q. Just a moment. Will you stop right there? Suppose on going down the packer should encounter some obstruction in the well, what would be the effect upon the so-called main valve?

A. The packer encountering an obstruction here would be impeded in its progress and the weight of the pipe being let down on it would compress that spring there and cause that mandrel to move down and push the valve off the seat and allow the fluid to come in as far as the trip valve.

Q. Where is the trip valve now located?

A. It is right up in there.

Q. Then, if obstructions were encountered, the weight of the pipe pressing down upon the packer thus obstructed

might open the main valve so as to admit fluid as far up as the trip valve?

A. Yes. If that pipe were pressed on through that obstruction, however, this spring would snap the valve back together as the pipe was lowered on towards the seat.

Q. Could any of that fluid get any farther into the device than the trip valve under any circumstances?

A. Not unless the trip valve were leaking and it doesn't normally do that.

Q. All right. Now, please lower it. Now where is it coming to?

A. The anchor is passing through the seat into the "rat-hole".

[fol. 257] Q. That is the perforated nipple below the packer?

A. Yes. And the packer is coming down onto the seat. Now the packer is down upon the seat.

Q. Is it sometimes found difficult to secure a firm and complete seat which will seal off the fluid from above the packer from the formation below?

A. Yes.

Q. What, then, do you do?

A. Well, whenever that is put on the seat it is customary to set it down there and let the weight of the drill pipe down on it and then raise up some on the drill pipe and let it down again. That is what we call spudding a packer down on the seat. At this place here the packer might be considered a stopper and that "rat-hole" a container of which the walls were porous, for instance, a bottle that had porous walls. We set this on here and we have trapped the fluid down into that "rat-hole" and the weight put down upon it has to dispose of some of that fluid in order to make room for the packer to seat tightly to the formation. Furthermore, the walls of a well are usually lined with a film of rotary mud. That is the plastering action in the mud, which helps to support the walls. That seat would also be lined with that and the packer has to be worked down until it has gotten a firm seal against the formation because the soft mud under the side of the packer, with this weight of hydrostatic head upon it, would go out and cause the packer to leak as soon as the tool were opened.

[fol. 258] Q. How do you finally determine whether or not you have a firm seat so that there is a complete sealing off of the area below from the area above the packer?

A. We will take either a board or a piece of a carpenter's square and lay it across the top of the rotary table against the pipe and put a chalk mark on there, and then we will raise up on the pipe and let it down, and, if that chalk mark moves down, we put on another chalk mark and we raise it up and let it down again, and, if it moves down some more, we do it over again. And we work it that way until it doesn't go appreciably farther. It may not move more than that much each time after it is on the seat but we keep working it that way. Each time we let it down this spring compresses here and that mandrel moves down and opens the main valve, but the trip valve has not been disturbed.

Q. It has not been disturbed, so no fluid at any time under this spudding can go up into the sample chamber?

A. Correct.

Q. How do you know that there is not a leak down here at the packer so that fluid may leak down into the "rat-hole"?

A. We wouldn't know that until we opened up the tool completely. The trip valve is open. At that time the fluid stands to the surface around the drill pipe, and we look down through the rotary table between the walls of the hole right at the surface. You have a conductor string in there. We look down between that and the drill pipe and we watch that fluid, and when that tool is opened completely, if that fluid falls down and goes down the hole, we know the packer is not holding and the fluid is going down [fol. 259] past the packer and coming into the empty drill pipe, and that is not a test. That doesn't give you a chance to test the fluid in the "rat-hole." The purpose of that packer is to get that off from the "rat-hole."

Q. But the operation fully discloses that, so that you are not deceived by any fluid that you find there?

A. No. If that packer leaks, the fluid will drop and it drops rapidly.

Q. And you know immediately there is a leak?

A. Yes. When you are testing in formation that is quite porous a certain amount of the drilling fluid will seat in those upper formations. In that case this fluid will just lower very slowly, but when it leaks by a packer you have the fluid, with a high hydrostatic head, passing through a relatively small opening into a drill pipe that is empty. So it is under high pressure on one side, with a small opening, and a low pressure on the other side. And it passes quite

rapidly and will damage the seat in all probability as it goes through. So that it will drop faster if you leave it.

Q. Can you turn that pipe a little bit so that the openings that have been made in it will disclose to his Honor the fluid as it comes up through?

A. When he picked up then, the equalizing valve opened, and as he sets it down again it closes.

Q. Will the working of that equalizing valve be disclosed in the operation that we are about to have?

A. Yes. When we are through this test and ready to pick this up, if we will watch this when he picks up, the mandrel will come up like that, and if we will watch closely we can [fol. 260] see the fluid going along those holes and coming out down in here.

Q. That is right here (indicating)?

A. Yes.

Q. The operator here is supplying the weight and pressure which is ordinarily, in the active and field operations, supplied by the weight of the drill pipe? He is pressing down in place of that?

A. Yes.

Mr. L. S. Lyon: What are you pumping that pump for?

Mr. Morgan: To supply the pressure which would ordinarily come from the natural formation.

Mr. L. S. Lyon: I thought he did that before. What is he doing it for now?

Mr. Morgan: He releases it when he backs it off. If you will notice here, Mr. Lyon, he presses down——

Mr. L. S. Lyon: If he is going to keep on operating that at different times I think it ought to be in the record.

Mr. Morgan: All right. Let us show that the operator is supplying, by this particular pump, air, in order to create the pressure which would ordinarily be there in the operation of the well down in the formation.

A. This pipe has been pressed down, and you will notice that the main valve spring is compressed; it is in a collapsed position.

Mr. Morgan: Now, will you supply some pressure there, Mr. operator, please?

(Operator did so.)

[fol. 261] By Mr. Morgan:

Q. Now, that hasn't been tightened very much?

Q. Now, the first fluid to come from the formation area will be what?

A. The little drilling fluid that is in the "rat-hole" will come up, and then the fluid from the formation will come into the "rat-hole" and it will come on up.

Q. All right. Now are you ready to make your test?

A. Yes. It is all set ready to open the valve.

Q. Now will you open the trip valve? You are now using an iron rod?

A. Yes. The fluid can be seen rising through this glass. There is your fluid coming on in there.

Q. That is the drilling fluid, the white fluid, and then comes your red or your formation fluid?

Mr. L. S. Lyon: What are we pumping this thing for now?

Mr. Morgan: To supply pressure. Now you can stop the pressure whenever you get far enough.

Q. Looking through the glass in the drill pipe, it shows red, does it not, which indicates——

A. Yes.

Q. —that the formation fluid has come up into the sample chamber or drill pipe?

A. All the way through this string of pipe. Now, when the go-devil is dropped it opens the trip valve and it passes through the trip valve and on into the drill pipe.

Q. The next procedure is to entrap your sample?

A. Yes.

[fol. 262] Q. Let us proceed to do that. Will you show the court how the springs open and how the equalizing valve operates when the pressure is lifted?

A. It is opening up there now.

Q. The packer is still seated?

A. The packer is still on the seat.

Q. Is the so-called main valve closed?

A. We just can't deal with the relative pressures here that we have in the well, and that pressure pump has been supplied just purely——

Q. Is the equalizing valve open?

A. No, the equalizing valve hasn't opened up yet. As he picks up you see that mandrel moves up.

Q. The main valve is closed?

A. Yes. The main valve closed when the spring opened. The fluid is coming down. This fluid is dropping here.

Q. You will notice the fluid outside the drill pipe is entering the pipe through there and passes down through those holes, and down, and up through these perforations here into the "rat-hole." Now, are you ready to withdraw your sample?

A. Yes; we are ready to withdraw the tool from the well.

Q. Now, stop for a minute right there. You are some distance above the place where the packer had been seated?

A. Yes.

[fol. 263] Q. Now, suppose a blow-out comes, how will you circulate so as to prevent that well from blowing out?

A. Well, just hitch the pumps on through the kelly, as we call it, and start the fluid pumping, and pump this fluid clean out of here, and pump this circulating valve ball off of the seat, and the fluid would go right on down, and some of it will come out here, and some go on and come out here.

Q. As you withdraw the device, together with the drill pipe, from the well you take each stand of drill pipe off as a separate and distinct operation, do you?

A. Yes.

Q. In other words, one stand of pipe is taken off and set back?

A. Yes, set back on the derrick.

Q. And the same with the next one, and so on?

A. Yes.

Q. It would be necessary for you to take back those different stands of pipe and put them on the pipe below, in order to make a seat, before you could circulate?

A. Oh, no, not with this device. We can circulate from any point in the well.

Q. Without any great loss of time?

A. Yes.

Q. Will you go ahead now and take it out? That is not the actual operation, because each stand is taken off as it comes up.

Mr. L. S. Lyon: That tool isn't taken apart?

Mr. Morgan: Oh, no. I mean the stands of drill pipe.

Mr. L. S. Lyon: There isn't any drill pipe on there.

[fol. 264] Mr. Morgan: Yes. This is drill pipe right here. This is intended to represent drill pipe.

Mr. L. S. Lyon: The part that the sample is in you don't take apart at the top of the well, do you?

Mr. Morgan: Mr. O'Neill will answer that.

A. Well, for instance, we are testing on a 5,000-foot hole, and we have a high pressure sand, and we get 3,000 feet of drill pipe full of oil. To get that 3,000 feet of drill pipe out of the hole it will be necessary to unscrew it in stands and set it back on the derrick, and then unscrew the next one and set it back, and so on. We take a sample every time we break a joint. Here is the go-devil. You can see it through there, sitting down on top of the trip valve, that rod.

Mr. L. S. Lyon: Is this the way you are supposed to take a sample, out of the pipe or the well?

By Mr. Morgan:

Q. Will you explain whether that is the method you use?

A. We break off the drill pipe until we get down to the tool. As we pull it out of the hole we set back a stand of drill pipe, and pull up another one and unscrew it and set it back, until we finally pull up to where the tool is. Then we just pull the tool up in the derrick and break off the circulating valve, and that permits the fluid to drain back through, to drain the sample out of the bottom of the tool.

Q. Each stand of drill pipe above the device is usually full of fluid, is it?

A. Not unless we get a full string. If the well flows to the surface you would have it full to the surface, but if [fol. 265] you just place it in there 200 feet you would only have 200 feet of fluid.

Q. In 200 feet of drill pipe?

A. In 200 feet of drill pipe and tool combined.

Q. Now, Mr. O'Neill, I believe you stated that you were familiar with the Halliburton device and the Simmons device from having seen models and drawings and specifications. Referring first to the Simmons device, does the Simmons device contain any valves which are opened or closed by a vertical pressure of the drill pipe?

The Court: Just hold that. Is it necessary for the witness to illustrate his answers now in the way we have been doing?

Mr. Morgan: I don't think so, your Honor.
The Court: You can take the witness stand now.
Mr. Morgan: I think he can go back to the witness chair.

By Mr. Morgan:

Q. One other thing. I notice above the packer here you have certain canvas wrapped with rope. What is the object of that?

A. Well, that is a theory of ours. We don't know whether it operates or not. But these ropes are cut so the canvas is loose when going in the well, and we think that if a very minute leak started where this packer is joining the seat, that the fluid passing out would suck that canvas into it and probably stop it. That is the theory we have in putting it on there.

Q. Now, you have here the complete device, shown on the floor?

A. Yes.

[fol. 266] Mr. Morgan: We offer in evidence this life-sized and complete device known as the Johnston device as Defendants' Exhibit No. D.

The Clerk: Defendants' Exhibit D.

Mr. Morgan: And we also offer the model of the well, and that will be Defendants' Exhibit E.

The Clerk: Defendants' Exhibit E.

Mr. Morgan: And we also offer in evidence the model that was used in operating in that well.

The Clerk: That is defendants' Exhibit F.

The Witness (continuing): The only valve in the Simmons device is opened by a rotary movement of the drill pipe which in turn causes the upper member of the valve to rotate upon the lower member. There are no spring valves used in connection with the Simmons device. It is not possible in the operation of the Simmons device to open the valve by the downward pressure or movement of the drill pipe. It is not possible to close the valve in the Simmons device by lifting the drill pipe or by the operation of any spring upon the valve. That is also true of the stop cock and gear device. In other words, there are no spring valves in the stop cock and gear device. The valve in the stop cock and gear device cannot be opened nor can it be closed by any vertical or upward movement of the drill

pipe. In the later Halliburton device, known as the "J" slot device, the valve is opened by a vertical movement, but the tool is unlatched by a rotating movement to be put in [fol. 267] a position where the vertical movement will open the valve. In other words, in the later Halliburton device the rotating movement does not, in and of itself alone, open the device. It simply unlatches the plug or pin and places it in a position where the vertical or downward movement of the drill pipe forces the valve open. To that extent it is similar to the Johnston device. The valve in the "J" slot tool contains springs. Up to the time that that particular device was placed upon the market, none of the Halliburton devices to my knowledge contained spring valves upon which there was exerted a vertical pressure to open them. I never saw one, anyway. None of the Halliburton devices, up to the time of the "J" slot device, to my knowledge contained any such feature. The Johnston devices have, ever since I have been acquainted with them, contained that particular feature. In the Simmons device the valve would be opened by rotary motion of the drill pipe. If the valve were set too tight to open conveniently and there were a leak in the drill pipe, the tool might be pulled finally from the hole, if the test was over, and the fluid found in the drill pipe believed to have come through the tool, while it may never have come through the tool; it may have leaked into the drill pipe above the tool, and the valve may never have been opened. With the stop cock and gear device, with that you would not be definite, where a small amount of fluid were recovered in a test, whether it had leaked into the tool through the drill pipe or whether the valve had been opened, unless the fluid itself were indicative of where it came from. If the fluid were oil or gas or water, you would expect that the valve had been opened [fol. 268] and that it came from the formation, but if it were mud, such as we get in a negative test, there would be no way of being sure whether the fluid leaked in or came through the valve.

The device which you now show me is a casing packer and is a device that is used on the bottom of the testing tool which I described this morning, in making a shut-off test in casing for the purpose of determining whether or not the cement which has been pumped down through the casing and upon around the outside between the casing and

the walls of the hole has effectively shut off the water which may be above that point in such a manner that the water will not have access to the oil zones below. Normally casing is not set or cemented in a well until something has been found that would appear to be of value. However, a casing is at times set where a hole is not standing up too well, and it is caving some. And in that case it is set to protect the walls of the hole, and where it is so set a shut-off test may be required. But when the casing is set because of some valuable product encountered in the formation and to protect that product, why here in California test is required to show that the water which would lay above that productive horizon has been excluded from it. In making such a test the casing is already in the well and has been cemented off, and when I say has been cemented off, that is the common way of doing it. There are times when you get a formation shut-off. It is done commonly when trouble is encountered in putting the casing into the hole. So that it is impractical, and at times almost impossible, to force the cement around the casing. That is an undesirable condi-[fol. 269] tion, but it happens. But the rule is at this time to cement off those things. The Johnston Company uses a packer like this.

Briefly explaining this packer, I will state that the perforated anchor screws into the bottom collar just as it does on that "rat-hole" packer. These slips, grooved metal articles, are designed so that when this has been lowered into the well to the point where it is desired to pack off, that the packer may be unlatched, allowing the mandrel to pass down through this sleeve, these springs holding a friction hold against the casing, holding this casing still while the mandrel is turned to unlatch it; and then they hold it still further while the mandrel passes down, and as it passes down the slips rise right up on that tapered member here which we call the bowl. In so doing that taper expands the slips out against the pipe, and as the weight is set down upon it these slips bite into the metal and take hold, so that more weight is let down and they press tighter. They are more or less wedge-shaped. Then as the weight is let down completely upon this member we have a packing element in here, composed of canvas and rubber molded rings, and the weight comes down upon this top member while this member is

held stationary by the slips, and through there there is a sliding sleeve, so that, as this comes down, it expands these rings against the casing and thereby effects the seal. This packer is designed to seat and expand, forming a seal upon the casing. In my opinion, it is not possible to use a packer in a shut-off test without setting it against the casing. I don't know of any way of setting a packer against the formation in order to establish a water shut-off test. [fol. 270] I don't know of any way it can be done, because, if it was set against the formation, the seal would take place below the bottom of the casing, and in that way the hydrostatic head of the drilling fluid in the well would have access to the point where the test is to be made. In casing tests sometimes we have a little oil sand or gas sand open, and that may be tested along with the shoe of the casing, but it is preferable on a casing test—and by that I mean a test of a water shut-off—to not have any production open below at the time, because it sometimes is confusing as to the effectiveness of the shut-off.

(The packer just identified by the witness was offered and received in evidence as Defendants' Exhibit G.)

The Court: For the benefit of all concerned I will say that I hope you appreciate that I am trying to follow this case as we go along, but I am not impressed with that trip valve element at all. I do not see where it cuts any figure in the case, because the end to be accomplished is to secure that material that comes into the "rat-hole" and bring it to the surface. It is true that the trip valve operates probably to insure against dilution of it or deterioration of it or mixing with some other element. At the same time, it doesn't strike me that that is a part of or related to the patent itself. That, you might say, is somebody else's business, not contemplated in the patent, that is, to guard it against some of the many incidents and dangers that happen in this business, as in all other businesses. I may be entirely wrong about this. I feel, however, that I should [fol. 271] explain to you as we go along just how it is developing in my mind.

Mr. Morgan: Thank you, your Honor. We certainly appreciate the fact that your Honor does so, because that, to our mind, is a very important factor, and we certainly appreciate your Honor's frank statement.

The Court: Well, you will have a very hard time to convince me that this trip valve amounts to a terrible lot so far as the patent itself is concerned. Now, mind you, according to my view now this patent is, as I expressed it a moment ago, devoted to the movement of this material that comes in from the stratum and affording an opportunity to examine it without the removal of the mud and the removal of the pipe. All right. Go on.

Mr. Morgan: Does your Honor feel that your Honor fully understands the function and nature and necessity for this trip valve?

The Court: Yes, I think I do. I think I understand that the purpose of the trip valve is to insure purity of the test, that is to say, the absence of any foreign matters that will prevent you from making and getting an accurate test of what you find in that "rat-hole". That is about right, isn't it?

The Witness: That is one of its purposes.

The Court: Isn't that its sole purpose?

The Witness: No. We consider the trip valve as the entrance valve.

The Court: Stop right there.

The Witness: To the sample chamber.

The Court: Suppose you didn't have that trip valve, and suppose that there were no leaks or anything in the pipe [fol. 272] that would bring some foreign substance in. Do you get me?

The Witness: Yes.

The Court: Would you have to do anything more than bring the whole matter to the surface? You would have the contents of the "rat-hole" there, wouldn't you?

The Witness: If there were no leaks in the pipe and no obstructions in the hole, in an ideal case, you would go right down and set the packer on the "rat-hole," compress the springs, and let the fluid in, and raise up, and the springs will close that main valve and trap the sample, yes, sir, that is correct.

By Mr. Morgan:

Q. Will you explain fully all of the different factors which that trip valve undertakes to correct, the different things that may enter into the obtaining of a test, which, by means of the trip valve, enables the test to be a successful one?

A. In the first place, we close the trip valve before we start in the hole, so there is a stoppage in the string of pipe that would prevent fluid going into the sample chamber.

The Court: From where?

A. If the main valve were opened by any obstructions, rough places in the hole, and that frequently happens going in. Without the trip valve, if the main valve should open, I would have taken fluid into the drill pipe, which would be merely drilling fluid, long before I reached the shoulder and set my packer. Any obstruction would cause the weight of the drill pipe to compress the spring and open the main valve, and without the trip valve I might have ever so much fluid in the drill pipe, and I would have no way of knowing [fol. 273] how much. With the trip valve in there the fluid can't go into the sample chamber, even though the main valve opens. When I strike an obstruction in the hole the main valve will open, and as quick as I have pushed the packer past that obstruction the spring will snap the main valve shut again. That does not affect it at all, because the trip valve is holding the sample chamber dry until such time as I drop the iron rod in and open it.

The Court: Your trip valve is above the sample chamber?

A. It is at the bottom of the sample chamber, but above the main valve.

The Court: If you didn't have any trip valve at the place where the trip valve would be, that would be the bottom of the sample chamber; is that right?

A. Yes, sir. If there was no trip valve the sample chamber would be open whenever I open my main valve.

In seating the packer it is necessary to give the packer considerable weight, so that the main valve opens every time I put the weight down on the packer. If the main valve opens that way and the packer doesn't make a perfect seal on its first contact with the seat, then the fluid which I am trying to pack off above, without the use of my trip valve the fluid would come past the packer into the drill pipe and on up, because it has a high hydrostatic head down on the packer, and the drill pipe is empty, and that fluid rushing past the seat would cut the seat in such a manner that one couldn't pack off. And it is a little diffi-[fol. 274] cult—we might have reason to believe—we wouldn't know—we might have a perfect seal the first time, but we wouldn't expect it, and we work that packer

down on the hole, on the seat, to get all the mud out from under the contact between the packer and the shoulder, and without the trip valve we couldn't do that. When we do work the packer down on the seat we allow the weight of the drill pipe to come down on the packer, and that opens the main valve, and when we raise up with it it closes the main valve. That is what we call spudding a packer. We spud those packers several times, in order to get them down on the seat, until they don't go down any further, and then when that is done our main valve has been opened several times and our trip valve has been closed. If it were run without the trip valve the pipe would have a lot of drilling fluid in it, and no one would know how much. But with the trip valve we would keep that out of our sample chamber until the packer is firmly seated. It would be possible that you could by some means close the main valve when you wanted to; to run your device into the hole down to the "rat-hole" seat with the main valve open all the way, without affecting the sample in the slightest. I could put something under that main valve to hold it open and, using my trip valve, go right on down and set the packer, and then in pushing the main valve open further why the object holding it open might be dropped out. I had one [fol. 275] test run in Ventura which showed the necessity for this trip valve in connection with a tester. I had one run in Ventura which was a test of a shut-off, and a representative of the Division of Oil and Gas was present to witness the test.

By the Court:

Q. Was it a water test?

A. Yes; a test of a shut-off required by the State. And, after the test was completed, we pulled out and found fluid in the pipe. The oil company operator didn't expect to find very much fluid on a dry shut-off test and it wasn't surprising when we found, as I recall it now, about 200 feet of mud in the drill pipe. And the representative of the Division of Oil and Gas said, "That seems to be a clean test. There is no water present. It is all right." And I asked if he wouldn't remain with me until I had dismantled the tool to let me see that it had all worked because we had an idea that the trip valve hadn't opened. The pipe usually jumps a little when it opens. So I dismantled the tool and showed him that the trip valve was still closed and that the fluid was

on top of the trip valve. That showed me that there was a leak in the drill pipe, which might never have been discovered but for that fact and the test might have been passed as it was and considered a test of that shut-off when, as a matter of fact, that shut-off had not been tested. And we then discovered a leak, removed it and went back in and made the test over. If the trip valve had not been in there, the test would have been misleading. It might have been very misleading.

[fol. 276] Cross-examination.

By Mr. L. S. Lyon:

The Witness: I appeared as a witness and testified for the defendants before Judge Randolph Bryant a year ago last June at Sherman, Texas, at the trial in the United States District Court there of the case of these plaintiffs against the Johnston Formation Testing Corporation and E. C. Johnston. In my testimony before that court I explained the operation of the Johnston tester, but I don't believe I explained it to the detail that I have here. I explained the device that I was familiar with, that I had been using in California. The device that I explained to the court in Texas is the same device that I explained here today.

Q. And that was the device that was involved in that case down there, that you explained to the court there, was it not?

A. The device used in California has the equalizing valve inserted into the string of tools that is not in the Texas string of tools,—that valve is not used in the Texas work.

Q. Otherwise, the device there is the same as the one you have described here?

A. The principle of it is the same.

Q. Well, it is exactly the same, isn't it?

A. I will have to say no again because we have remade the tools that Mr. Johnston brought into this country, and we have changed the lengths of various parts and strengths and materials so it is not the same device; but the same principle is involved in the operation of it.

[fol. 277] Q. These tools that are used by the defendant that you are employed by, and which you have described

today, were originally brought here from Texas, were they not?

A. Not these very tools.

Q. Well, ones just like them?

A. Very similar to them.

Q. Well, this style of tool?

A. This style of tool.

Q. And so far as the principles of operation are concerned and the construction, and I am not referring now to the dimensions, they are the same as those employed by the Johnston Company and that you testified to before Judge Bryant?

A. The same general principle of operation. I didn't, however, as I recall it, testify concerning a casing packer in the Texas case.

Q. I am not asking you about the casing packer. I am asking if the tool that you explained down there to Judge Bryant isn't the same tool that you have explained here.

A. I have answered it as clearly as I can, Mr. Lyon, that the tool I explained to Judge Bryant operates on the same principle but it is not the same tool.

Q. It is the same design of tool, isn't it?

A. The same design of tool.

Q. You were cross-examined down there in regard to the explanation that you gave to Judge Bryant, were you not?

A. I believe I was.

[fol. 278] Q. You explained the operation of the tool to Judge Bryant in the same way that you have explained it here, isn't that true?

A. Not in the same detail. I was on the stand in Texas, if I recall, probably not more than 30 minutes or such a matter, and I didn't explain in the full detail that I have explained here.

Q. You did explain the operation of the main valve, didn't you?

A. I believe I did.

I am not certain, but I think I explained the operation of the trip valve to Judge Bryant, and I may have stated the purpose for which the trip valve was used. I would not be certain about it. I explained part of the tool to him and I may have explained the trip valve to him. I don't know that I testified before Judge Bryant that the trip valve is used or employed as a safety factor to make the test more certain, but it is one of its functions.

Q. Tests can be made with the defendants' tester that you have described here without the trip valve at all, can they not?

A. I explained a moment ago to the court——

Q. Just answer the question yes or no.

A. Under ideal conditions; yes. I might explain further that ideal conditions are rarely encountered in drilling wells.

Q. And the defendants' device could be used and tests made without the spring on the main valve, could they not?

A. I don't believe they could.

[fol. 279] Q. Were you asked the following questions before Judge Bryant:

"Q.—Now, the main valve can be opened and closed without the spring but may, in the absence of the spring, open at times when it is intended that it should be closed, isn't that right?

"A.—Yes, sir."

A. Yes. It may be open and closed——

Q. Now, wait just a moment. I asked you if you so testified before Judge Bryant.

The Court: He said yes. Read that question and answer again, Mr. Lyon.

Mr. L. S. Lyon: "Now, the main valve can be opened and closed without the spring, but may, in the absence of the spring, open at times when it is intended that it should be closed, isn't that right?

"A.—Yes, sir."

By Mr. L. S. Lyon:

Q. To clarify this matter, although it may have been already covered, can the defendant's device be used for the purpose of effecting a satisfactory test of the formation if there be no trip valve used or employed there?

A. I would say yes with the explanation that it would have to be under ideal conditions, conditions rarely met with; that it might be possible but it wouldn't be expected and, unless the fluid that was taken in on the test was indicative of its source, that the source of the fluid might be questioned.

Q. If you had no trip valve and were making a test in a well where you had enough shoulder, that is, the difference between the size of the "rat-hole" and the size of the [fol. 280] big hole was sufficient so you could cut the packer very much smaller than the big hole and thereby relieve any possibility of opening up the main valve going into the hole, either by friction or fluid or by a spot in the well or a bridge, so that you could get the tool to the bottom without having the main valve open, could you get a test?

A. Provided I could seat my packer on the shoulder without having the fluid cut the shoulder away, with the same qualifying remark, that, unless the fluid taken in was indicative of its source, there might be some question as to where the fluid came from.

Q. If this valve in the Johnston device, the main valve, was so designed that it could not accidentally be opened going down the hole, you would not need the trip valve, would you?

A. Yes; we would need the trip valve, I feel.

Q. For what purpose?

A. Determining leaks; whether we had made a test or whether we had taken in fluid through a leaky joint.

Q. But for no other purpose?

A. Well, that is one of them.

Q. I am not asking you that. That would be the only purpose you would need it for?

A. If it were not opened accidentally going down the hole—does that include if it would not open while the packer was being seated?

Q. Yes.

A. At this moment I don't think of any other serious reason.

Q. With the form of valve shown in the Simmons patent in suit or in the Halliburton stop cock device a trip valve would not be of any help with the possible exception [fol. 281] tion of being able to detect a leak in the pipe, is that correct?

A. With the rotating type of valve you would not open the valve in seating the packer, so that you could press it down to a firm seal. I don't think of any reason why you would need it other than detecting leaks in the pipe on the rotating type of valve. There is this qualification, though, if I may make it: In going into a well the bore frequently is not thoroughly straight. In fact, it is very rarely

straight. There are turns in the bore. We think of a well as being a vertical hole but it is not and surveys of a well show that. If some twist in the hole is encountered with the rotating type of tool, which might turn the lower end of that tool, and there are cases I have heard of very definitely in the oil fields where a tool has been into a portion of the hole, and that would tend to rotate it, it might open your valve and then, without a trip valve, your fluid would equalize into the drill pipe.

Q. Have you any knowledge of that ever happening in these 7,000 tests that were made with this stop cock device?

A. I have not been present at any of the 7,000 of your tests, Mr. Lyon.

Q. There is no reason why a trip valve could not be put at the bottom of the drill pipe and used with the Halliburton types of testers or the Simmons original tester, is there?

A. No. The trip valve can be inserted into any string of pipe.

Q. Do you intend that the Court shall understand that the use of a trip valve is the only way you can tell whether [fol. 282] your drill pipe is leaking or not when you are making a test?

A. Not of the trip valve that we have there.

Q. Or any kind of a trip valve or the frangible disc? Do you have to have one of those kinds of devices in order to know whether your drill pipe is leaking? Aren't there other ways that an oil man will know whether his drill pipe is leaking or not.

A. There may be other ways, Mr. Lyon.

Q. Certainly. You know there are other ways, don't you?

A. It would depend entirely on how much it was leaking. I don't know of any other way right now to find out whether one is leaking or not unless the leak is very severe.

Q. You described this in connection with the packer leaking when you were trying to set the packer how you would tell that the mud fluid was leaking by the packer, didn't you? You described that, didn't you?

A. Yes. And the fluid would drop.

Q. Outside of the pipe at the top of the well?

A. Yes.

Q. You could see it go down the well, couldn't you?

A. Yes.

Q. Then, if it is leaking into the drill pipe, can't you see the level of the fluid going down the well in just the same way?

A. A leak——

Q. Just answer that yes or no.

A. If it were leaking fast enough, yes. But it may not be leaking fast enough. A leak in a tool joint might be very hard to see on the joint with the naked eye but under [fol. 283] the pressure that that hydrostatic head has against the joint it might leak considerable fluid.

Q. Wouldn't that be shown on the outside of the pipe?

A. I don't think it would necessarily be recognized. As I explained on that model, in testing in formation that is porous some of the fluid will seep away in the formation and the fluid will lower slowly. That might be mistaken for fluid seeping into the formation.

Q. You put a wet cloth over the drill pipe at the top, don't you?

A. Not while going into the hole.

Q. You could do it, couldn't you?

A. I have done it; yes.

Q. And, if your drill pipe is filling up with mud fluid while you are running into the hole, it would be pushing air out against that wet cloth, would it not?

A. If it were leaking very slowly, it might not be discernible.

Q. But it would have to be a very slow leak?

A. I wouldn't say it would have to be very slow.

Q. How much mud fluid do you think could get into one of these drill pipes without you being able to discern it at the top of the well? Do you know?

A. That is a matter that might be hard to answer, Mr. Lyon. I gave an example a moment ago, where, as I recall, we recovered 200 feet of fluid in a leaky drill pipe. We had to run that string, as I recall it, twice and test each occasion as we went down to find the leak.

Q. I am not asking you that at all. I am asking you how much mud fluid could leak into the drill pipe without you being able to tell at the top of the well it was leaking.

A. I don't believe I could answer that.

[fol. 284] Q. You could determine if there was a big enough leak in the drill pipe to effect the same drop in the level of the mud fluid at the top of the well that you described in connection with the packer leaking, couldn't you?

A. If the fluid fell rapidly enough to know there was a leak, then we would know it; yes. You couldn't know whether it was leaking by the packer or through the drill pipe but you would know it was a leak.

Q. How long has it been that the Johnston tool that you have described has had this trip valve used with it at all?

A. The Johnston device has had the trip valve ever since I have been working with the company.

Q. You referred to patents, or counsel did, on this Johnston tool. The original patents don't describe or call for the use of any trip valve, do they, under which this device is made?

A. I believe the original patent, although I am not sure of this because I haven't studied these patents very carefully, calls for the main valve and that another patent covers the trip valve.

Q. The patent that you referred to on the trip valve that is used in the Johnston tester is limited to a specific construction of a trip valve, that is, it doesn't cover the broad idea of a trip valve, does it?

A. I don't really know.

Q. Well, you do know that it was old in the oil well art long prior to this well tester to use frangible discs that could be broken by go-devils, don't you?

A. That, I think, is right. I gather that from prior publications, that the frangible disc is rather old, old enough [fol. 285] that it was used back in the early—well, I couldn't say the dates but probably in the '80s or along in there.

Q. To insure against fluid getting into the pipe?

A. Apparently with the purpose of running the pipe dry.

By the Court:

Q. Suppose that go-devil does not happen to hit the top of the valve, what will happen?

A. Well, sir, we construct the top of the valve so that the go-devil will hit it.

Q. What is its diameter with respect to the diameter of the pipe?

A. There is very little space left. I don't know the actual figures but it is not the width of the go-devil that is left around it. It is constructed with the idea that, even though the go-devil should rock or hit and bounce from one side to the other, it is bound to hit.

Q. It can't miss?

A. I don't think it can miss. It might in hitting an obstruction be so slowed down that it would not open when it hit it but that rarely happens.

The equalizing valve of the Johnston tool is designed for the purpose of lessening the pull that you have to give the packer to raise it out of the well. The Johnston tester would work without having the equalizing valve feature on the packer. In deep wells and large packers that is a safety facto that is very important. We at times now in the 2½-inch tool, which is smaller than that tool I showed you today, run that without an equalizing valve because there is not a column of fluid to lift. But on the larger packers the pull is very severe and that is why this valve was designed and [fol. 286] put in there. It is an added safety feature in deep wells. I don't believe they use it with the Johnston tool in the Mid-continent.

"Q. There is no reason why that equalizing valve cannot be used on the packers employed with the Halliburton testers, is there?

A. That could be screwed onto another packer. It wouldn't have to be a Johnston packer in order to screw that valve onto it." We don't buy our packers with that equalizing feature in them. We make our formation packers and our equalizing valve is separate. I believe Mr. Johnston has a separate patent on that. Olympic packers are casing packers. We run the equalizing valve in addition to the by-pass valve that is in the casing packer. I couldn't say whether the idea of an equalizing valve for a packer is a very, very old idea or not. I am not sure that equalizing valves were described on packers 40 or 50 years ago. I am not sure that I do know that. I haven't studied the patent art a great deal. I know that the drawings of the Halliburton testers that I have seen of the "J" tool type, the recent tool, show an equalizing valve. I presume that the same packer that is used on the "J" tool could be used on the stop cock tool. I don't know the connections there, but I presume it could. The equalizing valve would perform the same function on one tool as on another, but with reference to the stop cock tool I have seen drawings and models, and none of them have shown an equalizing valve with it.

The Court: I think, Mr. Lyon, you asked a moment ago if the equalizing valve could not be used on the Simmons

patent. I don't know whether the witness answered that. I didn't hear his answer.

[fol. 287] By Mr. L. S. Lyon:

Q. It could be, couldn't it?

A. It could be included with the Simmons tool as a separate valve.

Q. As far as this circulating valve which you described this morning is concerned, and which is not illustrated on the diagram that is at the side of you here——

A. May I make another remark with reference to including the equalizing valve on the Simmons device?

Q. Certainly. I can remember that question.

A. In order to do that you would have to rearrange the Simmons device to put your trip valve above the equalizing valve, because you would equalize your flow right into the drill pipe; under the present condition, the way it is made. You see, you have your valve members right on top of the packer, and there is no provision there in the Simmons device for installing an equalizing valve, unless it were installed above that, and that would equalize your fluid into your trapped sample.

Q. But you could see how to incorporate an equalizing valve in the Simmons structure, Exhibit 10, couldn't you?

A. Well, it would have to be installed between your trip valve here and your packer.

Q. But you could do that, couldn't you?

A. I don't know.

Q. Well, you won't say you couldn't?

A. And stay right with the drawings as shown in the patent?

[fol. 288] Q. No. Just take this device and put an equalizing valve with a packer in the device.

A. I could rebuild the Simmons device so that an equalizing device could be installed, but I don't know that I could say that it would still be the Simmons device.

Q. Irrespective of that, you take and change the design of this valve to put an equalizing valve on the packer, couldn't you, irrespective of what you would call it afterwards?

A. A form of equalizing valve on the packer?

Q. Yes.

A. There is one shown, I believe, similar to that arrangement, on the Halliburton "J" tool drawing, isn't there?

Q. Well, I am saying you could do that if you wanted to?

A. I could try to do it, anyway.

The circulating valve in the Johnston tool is another safety feature. If one wanted to sacrifice the safety feature, it could be eliminated from the valve, but it wouldn't be a safe tool, I would feel, to run. I don't know that the Johnston tool was run for a long time without the circulating valve. I am under the impression that the circulating valve is shown in the Johnston patent drawings. I may be wrong about that. I couldn't tell you in what percentage of tests with the Johnston tool we have to pump the drilling fluid down the drill pipe and lose the test. It happens rather often, though.

Q. How often—in 10 per cent of the cases?

A. I don't know that I could tell you in percentage.

[fol. 289] Q. How many times have you ever been on a well when it has been done?

A. I am not sure that I have ever personally had to use that valve, to pump through it, but it has been used in our work a great deal.

The Court: What are you talking about now?

A. The circulating valve, the one that we pump through. That spoils the test when we pump through it, but it is a safety factor in getting the tool out of the hole or in controlling the hole.

By Mr. L. S. Lyon:

Q. If you have to use that circulating valve then the test operation is spoiled?

A. Your recovery of the sample is spoiled, but that is—the circulating valve is a valve that I am frequently asked about in dealing with new customers. They want to know if I can circulate through that tool.

Q. How long has your company called this main valve of the Johnston tester the main valve?

A. Well, I don't know when that was named the main valve. It was called the main valve when I went to work with the Johnston people.

Q. And it has always been called the main valve, hasn't it?

A. I don't know what it was called prior to that time. I know they were calling it the main valve when I went there. My impression is that that was the first valve put in the tool, and they called it the main valve from that.

Q. You couldn't leave that valve out of the Johnston tester and successfully take tests, could you, and recover an entrapped sample?

A. No. In the present design I would need the main valve to recover an entrapped sample.

[fol. 290] Q. The way the operator opens that valve from the top of the well is by downward movement of the drill pipe; isn't that right?

A. Let the pipe down on this to open it.

Q. And the way he closes that valve is by an upward movement of the drill pipe at the top of the well; isn't that correct?

A. That is not always correct, Mr. Lyon.

Q. Is it ever correct?

A. Not always correct. That valve will close by the spring without the movement of the drill pipe, if anything happens to the shoulder that the packer is sitting on.

Q. If the packer slips away and does not hold its seat, then the valve will close?

A. That is right.

Q. But I mean, in order to close the valve at the end of the test, in the normal operation of the tool, the operator lifts——

A. He picks up on the pipe slowly, and the spring closes that valve.

Q. The valve head in the main valve is attached integrally to the drill pipe, isn't it?

A. It is screwed into the mandrel, and the casing member that holds the mandrel, that is screwed into the trip valve.

Q. And that valve head can't move up or down any faster or any slower than the drill pipe moves up or down; isn't that correct?

A. Any slower?

Q. Or any faster.

A. It moves faster.

[fol. 291] Q. Than the drill pipe?

A. Than the operator moves the drill pipe at the surface.

Q. Then something else has to move the drill pipe except the operator; is that right?

A. The operator picks up the drill pipe, and in so doing, in a long string of drill pipe there is a stretch—by a mark put on there at the rotary table it would pick up 18 inches before the drill pipe would leave bottom—and that puts a stretch on the drill pipe, and enough weight is lifted off of the spring so that the spring actuates the valve and takes up some of that stretch.

Q. What does the spring actuate? The spring is mounted there between the slideable part that carries the packer and the fixed part that is attached to the drill pipe?

A. Yes.

Q. Does that spring push the drill pipe up the well?

A. It merely takes up a portion of the stretch that the driller has pulled into the pipe.

Q. It actually pushes the drill pipe up out of the well, does it?

A. I didn't say that. I say it takes up some of the stretch that the driller has pulled into that pipe in lifting on the pipe.

Q. When the driller stretches that drill pipe does he stretch it——

A. He lifts the weight off of the spring and the spring actuates.

Q. How strong a spring is that?

A. That spring varies with the different sized tools. It takes about 15 or 20,000 pounds to compress the spring. It is a very strong spring.

[fol. 292] Q. Do you say that that spring can lift the drill pipe in the well?

A. I didn't say that it lifted the drill pipe.

Q. In order for that main valve to close, the valve head must move up to the valve seat; isn't that correct?

A. That is correct.

Q. And the valve seat can't move down to close the valve?

A. No. The valve head moves up to the seat.

Q. And the spring is holding——

A. Let me qualify my last answer.

Q. Yes, surely.

A. I presume you are talking now about when we finish the test and in trapping the sample?

Q. That is right.

A. The valve seat will move down to the head if the packer fails or if it passes through an obstruction.

Q. With the packer seated properly at the moment when you want to close the valve to bring your sample out of the well, you have got to close the valve by the valve head moving up?

A. That is right.

Q. That is the only way it can be done?

A. That is right.

Q. And that valve head is integrally fixed to the drill pipe, isn't it?

A. Yes; it is screwed into the tool, which is screwed to the drill pipe.

Q. Then the only way that the spring could snap that valve head shut, or snap it closed, would be to snap up the drill pipe, isn't it?

A. No. The driller has picked up the drill pipe and has a stretch in the drill pipe.

[fol. 293] Q. I am not asking you that. Answer the question yes or no.

The Court: Answer the question by yes or no, and then make your explanation.

A. No. It does not lift the drill pipe.

By Mr. L. S. Lyon:

Q. To snap the valve closed you have got to snap up that valve head, do you not?

A. Yes.

Q. If that can only move with the drill pipe the drill pipe has got to snap too, doesn't it?

A. There is a vibration felt on the drill pipe at the surface many times when that is done.

Q. Sometimes not?

A. Sometimes it is overlooked.

Q. As a matter of fact, that valve could be closed by lifting up the pipe to pull up the valve head without the snap being there, couldn't it?

A. It could be closed. It couldn't be kept closed, probably. It could be pulled together.

I would say that the tests made by either a Halliburton stop cock device or with the Simmons device would be uncertain. I don't know that they would be equally uncertain. I would say that both would be uncertain. I don't mean to testify that a successful test cannot be made with an uncertain tester. I mean it might take a test on one run and

on the next run it might not. The certainty of a test of that kind would depend largely on how indicative the fluid was that was taken in the test. If I ran a tester and recovered a couple of hundred feet of oil through the operation, I would consider that I had made a successful test.

[fol. 294] Q. And you can't see any reason why the Halliburton stop cock device or the device shown in the Simmons patent wouldn't enable you to do that if the oil was there, can you?

A. No. If you recovered an indicative fluid I would say your test was successful.

Q. Then what you actually mean in your testimony is that you think the Simmons device is uncertain or the Halliburton stop cock device is uncertain because, where you wouldn't get any sample at all, it may have been due to one of these difficulties that you have described; is that right?

A. I mean to imply that many times a test will recover mud and the fluid will not be indicative, and in such cases the source of that fluid might not be known.

If gas comes through to the surface it is reasonable to expect that it came through your tool, and I would say the tool worked, and if you got oil or definitely got salt water. Many, many tests, however, are what we term negative tests, and this would lead you to confusion. We very frequently make re-runs when we get a negative test, just to be sure that we haven't made any mistake.

Q. You do have difficulties with your tester, as far as 100 per cent accuracy is concerned, don't you?

A. I wouldn't say it was ever 100 per cent. We do have difficulty at times, but we feel that we know pretty well that we have made a test. Once in a while we have to go back and check it, not very often.

Q. You think that because of these safety features of your tool, principally the trip valve, that you are more certain in the case of a negative test than Halliburton would be [fol. 295] in the case of the Simmons device or the stop cock device; is that correct?

A. I am sure I would be more certain of the results obtained in running the Johnston device than I would be in running the stop cock or Simmons device.

Mr. L. S. Lyon: I am going to ask the reporter to read the question I just asked you, and will ask you to answer it yes or no.

The Witness: All right.

(Question read by the reporter.)

A. Yes, that is correct. I would be more certain of it.

Q. In your description of a testing operation you described rather completely the whole operation, involving the lowering of the tester on the drill pipe and how the drill pipe is made up and how it is handled and the complete operation. How much of that operation is performed by your company and how much of the labor involved in performing the operation is furnished by your company?

A. We send out one man with the tool I have shown there and the oil company——

Q. Exhibit D?

A. Well, I don't know the number.

Q. It is the one here on the floor?

A. Yes. It is that 3-inch tool there on the floor. And the oil company that we are running for furnishes the rotary crew that performs the labor of running the device into the well, they furnish the drill pipe and everything except the testing tool, and our man supervises the hooking up of the testing tool and the operation of it.

[fol. 296] Q. Does the oil company retain the control of its own men and the direction of its own men, the supervision of its own men, during the test?

A. Yes, they do. If an emergency would arise they might ask us what we had best do, and then they would direct the men to do what we said about it. It would depend on the man in charge, really. He would have the authority to step in and take charge in an emergency.

Q. In an ordinary operation, though, he doesn't assume charge of the drilling crew, does he, your man, in an ordinary testing operation?

A. In the ordinary testing operation he will leave it up to the man we send out to handle that.

Q. I mean your man doesn't direct the oil company's employees how they shall run the draw works or how they shall make up the pipe or how they shall operate the steam, or any of the usual operations on the well, does he?

A. No, not in the usual, ordinary operations; only in just what is connected wtih the testing. He would supervise the setting up of the joints so that they wouldn't leak, and if the operator was running the tool in too rapidly he would ask him if he wouldn't slow it down a little bit.

Q. Does the testimony that you have given as to what is furnished in the line of equipment and materials by your company, as compared with what is furnished by the oil company, apply to the tests that have been made with the Johnston tester for the Honolulu Oil Corporation?

"Mr. Boyken: If your Honor please, I object to that question and all other questions concerning the Honolulu Oil Company, on the ground, first, that it is not proper cross-[fol. 297] examination, and, second, that opposing counsel has rested his case as against the Honolulu Oil Company, one of the defendants in this case.

The Court: Overruled.

Mr. Boyken: An exception.

The Court: Yes.

Mr. Boyken: And without repeating that, may I ask that it be considered with respect to all this testimony?

The Court: Yes.

A. Yes, that is general procedure with us. We send out the tools and one man.

Q. And they furnish the rest of the equipment and the rest of the men?

A. They furnish the drill pipe, the draw works and the derrick, just as though they were running a bit into the hole. We have supervision of it to a certain extent. There has never been a clash on the rig that I know of. I don't know what would happen if we did run into that.

Q. Then, as an actual fact, your men and your equipment work jointly with the oil company's men and the oil company's equipment in taking the test; isn't that correct?

A. Well, I suppose they do work together there.

The Court: They co-operate?

A. They co-operate, yes.

By Mr. L. S. Lyon:

Q. And the oil company pays you a certain amount of money in connection with the services that you rendered or that your company rendered and the furnishing of the tester for that purpose; is that correct?

A. Yes.

[fol. 298] Q. Do you have any form of written contract with the oil companies for these jobs?

A. Well, the boy that goes out to run the tester has what we call a ticket book, in which the test is written up, and the

oil company representative on the rig, when the test is finished, signs the ticket, and he keeps a copy and we take a copy.

Q. Can you produce a specimen of the form that is used?

A. I haven't one with me. It is the customary procedure, I think, on all tools, service in the oil field, that when they finish the work the company man just signs the ticket, and later on you get a field order for it and include that with the invoice.

Q. All the tests that were made on any wells of the Honolulu Oil Corporation, using the tester of your company, were made on that same basis, were they?

A. As far as I know.

We have at times left the testing tool out at the well and let the oil company run it all alone. However, we try to have a man present when it is run. I believe that we have left a testing tool to be run by the Honolulu Oil Corporation without having a man present while the tool was being run. It is part of my selling work, really, to explain the testing tool to the oil companies and try to get some business on it.

Q. The Honolulu Oil Company has known how this tester was constructed and how it operated before it was used on their wells; isn't that correct?

Mr. Boyken: I object to that, if your Honor please, to inquire of this witness as to the knowledge the Honolulu Oil Corporation has. It is totally irrelevant to any issue here, and it is not cross-examination, further.

[fol. 299] Mr. L. S. Lyon: I want to bring out, your Honor, that the things he testified to here today, about the operation of this tool and how it was constructed, were made known to the Honolulu Oil Corporation, the other defendant, before the tool was run by the Honolulu Oil Corporation.

The Court: Sustained. It is not proper cross-examination.

Mr. L. S. Lyon: May I take the answer for the purpose of the record, your Honor? An exception.

The Witness: Am I to answer that?

The Court: What was that you asked?

Mr. L. S. Lyon: I asked for an exception, and asked if I could take the answer for the purpose of the record, subject to the exception.

The Court: Did your objection come before the answer or did he answer?

Mr. L. S. Lyon: We haven't had the answer yet.

The Court: I am not clear on just what you are asking.

Mr. L. S. Lyon: As I understand it, it is proper, if an objection is sustained to a question, to take an exception and ask that the answer be received, solely for the purpose of the record.

The Court: To see what the inquiry, if permitted, would amount to?

Mr. L. S. Lyon: Yes.

The Court: That is a new proposition.

Mr. Boyken: I have never heard of that, your Honor. It is done before masters, but I have never heard of it being done before a Federal Judge. Occasionally there is an offer of proof, but not the taking of an answer to a question where the objection has been sustained.

[fol. 300] Mr. L. S. Lyon: The equity rules provide for it, if we have the equity rules here.

The Court: They are on my desk, I think.

Mr. Boyken: I have no objection to it, your Honor, except that I am unfamiliar with that practice.

Mr. L. S. Lyon: The matter has been up in our Circuit Court of Appeals and has been up in the Tenth Circuit Court of Appeals in cases that I am familiar with, and it is rather an unusual rule; but it is one that the Circuit Courts of Appeal seem to insist on rather vigorously, and that is that in an equity case the record shall come up complete to them, so that, if they decide that an objection should have been overruled or sustained, the record shall be there before them of what the answer would have been. Of course, that can be carried, I suppose, to absurd limits. Let me take the rule. This is Equity Rule 46:

"In all trials in equity the testimony of witnesses shall be taken orally in open court, except as otherwise provided by statute or these Rules. The court shall pass upon the admissibility of all evidence offered as in actions at law. When evidence is offered and excluded, and the party against whom the ruling is made excepts thereto at the time, the court shall take and report so much thereof, or make such a statement respecting it, as will clearly show the character of the evidence, the form in which it is offered, the objection made, the ruling, and the exception."

Now, there are cases here in the footnote applying this rule. I was looking for the decision of our Circuit Court of Appeals construing it, but I don't——

The Court: Is it your recollection that the precise question has been passed upon by the Ninth Circuit?

[fol. 301] Mr. L. S. Lyon: Yes; I think it was, in a case cited here, although I would want to look at the case, but it is my recollection it was this case of Presidio Mining Co. et al. v. Overton et al., 270 Fed. 388, and it was passed on at length by the Tenth Circuit Court of Appeals.

The Court: Is not this the situation: This action is brought against both the Johnston Company and the Honolulu Oil Corporation; they have been charged jointly with the infringement. The witness in his direct examination was not questioned regarding any operation by the Honolulu Oil Company. He did say that his company did certain work. On cross-examination he was required to say to what extent that practice prevailed, that is, how much of the work his company did and how much of the work the patrons or employers of his company did, and he was asked further, and required to state, whether that custom prevailed with respect to the Honolulu Oil Corporation. Now he is asked—what is he asked?

Mr. L. S. Lyon: He testified this morning and explained how this Johnston tool is constructed and how it operates. The Honolulu Oil Company in its answers to interrogatories admits that it has employed the Johnston people to use this particular tool. I don't know whether this witness was called as a witness for both defendants or just one of them alone, but I am asking him now if the things that he testified to this morning, as to how this tool was made and how it is operated, if the same things that he told us were made known to the defendant Honolulu Oil Corporation before the tool was run in their wells. I want to show that they had knowledge, before the tools were run, of the very things that the witness has testified to today, as to how the tool [fol. 302] is made and how it is run. That is the sole question.

The Court: Yes, but do you not say that, in answer to the interrogatories, the Honolulu Oil Corporation admits the use of them?

Mr. L. S. Lyon: Yes.

The Court: Well, that is all you can show, isn't it?

Mr. L. S. Lyon: I would like to show, if your Honor will permit me, that this Honolulu Oil Corporation knew, before it ran the tool, how the tool was constructed and how it operated.

The Court: Would that make any difference?

Mr. L. S. Lyon: There are some decisions here to the effect that if it was true that this was an independent contractor and that it was not a joint operation, that if the proprietor had knowledge of how the instrument was made and how it worked, he is chargeable and liable for its use for him by the contractor, whereas, if he doesn't know of it, what it is, he may not be, if it is a case of pure independent contractor.

The Court: My view is that it is not proper cross-examination, not related to the direct testimony of the witness sufficiently to entitle it to admission as cross-examination. I think, however, that the purpose of the rule is accomplished without the answer being made. The rule seems to require that enough be shown so that the upper reviewing court will clearly understand the situation presented. The court will easily understand from the statement made what the question presented is. It is a new proposition to me, I confess. I don't ever recall seeing it put in practice.

[fol. 303] Mr. Boyken: I have never seen it.

The Court: I will withhold that ruling for the present time, and I will examine the cases.

Mr. L. S. Lyon: I would like to make one further observation, your Honor.

The Court: Yes.

Mr. L. S. Lyon: In connection with the order of proof which Mr. Boyken is objecting to, of course that is within the discretion of the court, and here we have an unusual situation. The answers of the defendant Honolulu Oil Corporation to the interrogatories admitted the use of this Johnston tester. There was no pleading in the answer to the bill of complaint whereby the Honolulu Oil Corporation said it was not liable but that only Johnston was liable, on the ground that Johnston was an independent contractor, no such defense set up. Mr. Boyken made no opening statement at the outset of this case and waited until our prima facie case was closed, and then for the first time he announces that he is going to claim that the Honolulu Oil Corporation is not liable for its use because the Johnston Company is an independent contractor. Now, I think under those circumstances the court is entitled to give us a chance to bring out the true facts in regard to that.

The Court: Well, would it make any difference, provided they actually used the thing? Isn't that all you want?

Mr. L. S. Lyon: That is all, really, yes. If they are actually jointly operating this tool, then of course the Johnston Company is not an independent contractor, and the oil company is equally liable with the Johnston Company. [fol. 304] The Court: Is it your view that if they are independent contractors then the Honolulu Oil Company would not be liable?

Mr. L. S. Lyon: Unless we can show that the Honolulu Oil Company understood and knew in advance how the tool was constructed and how it worked.

Mr. Boyken: I don't think it makes any difference what their knowledge is.

The Court: I am going to assume that the witness would say that they did, but I am going to sustain the objection on the ground that it is not proper cross-examination. I believe that is the correct rule. What is that Rule?

Mr. L. S. Lyon: Equity Rule No. 46, your Honor. This is your book.

(The following were then offered by defendants and received in evidence:)

Patent No. 46,124, to Lyons, as Defendants' Exhibit H-1.

(Book of Exhibits, p. 316.)

Patent No. 56,234, to Latham, as Defendants' Exhibit H-2.

(Book of Exhibits, p. 320.)

Patent No. 58,837, to Kewley, as Defendants' Exhibit H-3.

(Book of Exhibits, p. 324.)

Patent No. 68,350, to Burr & Wakelee, as Defendants' Exhibit H-4.

(Book of Exhibits, p. 328.)

[fol. 305] Patent No. 73,577, to Carll, as Defendants' Exhibit H-5.

(Book of Exhibits, p. 332.)

Patent No. 182,098, to Birge, as Defendants' Exhibit H-6.

(Book of Exhibits, p. 336.)

Patent No. 208,610, to Koch, as Defendants' Exhibit H-7.

(Book of Exhibits, p. 339.)

Patent No. 249,228, to Dower, as Defendants' Exhibit H-8.

(Book of Exhibits, p. 343.)

Patent No. 263,330, to Franklin, as Defendants' Exhibit H-9;

(Book of Exhibits, p. 347.)

Patent No. 582,828, to McGregor, as Defendants' Exhibit H-10.

(Book of Exhibits, p. 351.)

Patent No. 785,933, to Bloom, as Defendants' Exhibit H-11.

(Book of Exhibits, p. 355.)

Patent No. 1,000,583, to Cooper, as Defendants' Exhibit H-12.

(Book of Exhibits, p. 359.)

[fol. 306] Patent No. 1,347,534, to Cox, as Defendants' Exhibit H-13.

(Book of Exhibits, p. 365.)

Patent No. 1,474,630, to Halliday, as Defendants' Exhibit H-14.

(Book of Exhibits, p. 369.)

Patent No. 1,510,669, to Halliday, as Defendants' Exhibit H-15.

(Book of Exhibits, p. 374.)

Patent No. 1,514,585, to Edwards, as Defendants Exhibit H-16.

(Book of Exhibits, p. 386.)

Patent No. 1,522,197, to Macready, as Defendants' Exhibit H-17.

(Book of Exhibits, p. 391.)

Mr. Richmond: That Lyon patent was not pleaded. What was the second one you called?

Mr. L. S. Lyon: Latham.

Mr. Richmond: That isn't pleaded.

Mr. L. S. Lyon: Those two that you speak of that are not pleaded, that is, Exhibits H-1 and H-2, I understand are not offered for the purpose of anticipation?

Mr. Boyken: We will simply offer the first two to show the state of the art. I believe that they were mentioned in the expert's affidavit in opposition to the motion for preliminary injunction, so that they are not unknown to [fol. 307] the plaintiffs, but apparently they are not pleaded in the answer.

Mr. L. S. Lyon: And the same is true, I guess, as to H-17, the patent to Macready.

Mr. Boyken: We will offer the patent to Macready merely to show the state of the art, but that also is not unknown to the plaintiffs.

The Court: This applies to the first two?

Mr. Boyken: To the first two, H-1 and H-2, and also to Macready, which is H-17.

The Court: And also to what?

Mr. Boyken: To a later patent to Macready, which is H-17.

The Court: That is, No. 1,522,197 is not pleaded?

Mr. Boyken: It is apparently not pleaded as an anticipation.

The Court: So those three you are offering to show the state of the art?

Mr. Boyken: Yes, your Honor; and all the remainder to show the state of the art and also as anticipations.

We also offer in evidence portions of certain publications. The publications are here in the original form and are available to opposing counsel. I understand that opposing counsel has gone over these and will stipulate that we may offer in evidence photostats of certain pages of these publications, and I have those pages here, and I would like to put in the photostats of these certain pages, and the original publications are here.

In that connection I offer in evidence certain reports made by a man by the name of J. F. Carll in 1877, and [fol. 308] the pages have heretofore been designated, from publication II, being pages 126, 127, 128, 129, 130 and 131.

From another publication or report by the same man, entitled "Oil Well Records," also published in 1877, pages 196 and 197.

And an additional report by the same man, all bound together, I believe, pages 192 and 193; and then skipping over in the same report to pages 232 and 233; and skipping over to pages 263, 264, 265; and skipping over to page 294. That is the end of that chapter.

Then Chapter 29 of the same man's report, pages 311, 312, 313, 314, 315, 316, 317, 318, 319, and continuously up to page 324, with certain plates, which are really photostats, at the end thereof, there being two of those.

Mr. L. S. Lyon: Mr. Boyken, are you going to offer all of these pages about this subject that are written by this man Carll, under one exhibit?

Mr. Boyken: I thought it would be convenient to put all these publications that we rely upon under a separate cover, and I have done so, and these are what we consider the important pages, and I merely photostated certain pages of these publications and included those photostats under this cover, and I want to offer whatever is here under this cover.

Mr. L. S. Lyon: But I mean, are you going to give the separate materials separate exhibit numbers, like you did in the case of the patents?

Mr. Boyken: Yes; I think we will do that. I will offer the publications as Exhibit I, and the portion under that cover, which consists of various reports of Mr. Carll, as Exhibit I-1, I presume. The originals, your Honor, are included under this cover here. I may say that these Carll [fol. 309] reports are bound together in a publication called the "Second Geographical Survey of Pennsylvania, 1876 and 1877," and the title page says, "Oil Well Records and Levels, By John F. Carll." I will give the original publications to opposing counsel for his examination. We have furnished opposing counsel with a corresponding photostatic copy.

(Book of Exhibits, p. 396.)

Mr. Boyken: The next publication bound under the same cover is that of S. F. Peckham, entitled "Productive Technology and Uses of Petroleum and Its Products." That was published in 1880. We offer Plate XXIII, consisting of two drawings, and pages 6, 7, 12, 87, 88, 89, 90 and 91,

together with Plate VI. That will be Defendants' Exhibit I-2.

(Book of Exhibits, p. 430.)

Mr. Boyken: I offer in evidence as Defendants' Exhibit I-3 portions of a publication entitled "Fifth Annual Report of the United States Geological Survey to the Secretary of the Interior, dated 1883, by J. W. Powell, Director." The portions of that that we offer in evidence consist of the report of a man by the name of Chamberlin, and the pages are 157, 158, 159, 160, 161 and 162. I have the original of those here. I will ask now that these publications be so marked.

The Court: I understand that you have assembled there photostats of the pages that you have just offered in evidence?

Mr. Boyken: Yes, your Honor.

The Court: All right.

(Book of Exhibits, p. 441.)

[fol. 310] James M. Abbett, called as a witness in behalf of defendants, being first duly sworn, testified as follows:

Direct examination.

By Mr. Boyken:

My name is James M. Abbett. I am 47 years of age. I reside in Pasadena, California. I am by occupation or profession a patent solicitor. I maintain an office in Los Angeles, and have followed that occupation or profession for 20 years.

Q. Please state your qualifications enabling you to testify as an expert witness in this case.

A. In 1907 I graduated from Manual Training High School in Indianapolis, Indiana.

Mr. Boyken: Pardon me just a moment. Would Mr. Lyon admit Mr. Abbett's qualifications? That would save time.

Mr. L. S. Lyon: Well, I will do this, admit that he is an experienced patent solicitor and has testified in patent

cases as an expert witness. I don't believe that he claims to have any practical operative experience as to these tools at all, but as far as testifying as a patent solicitor or familiar with reading patents, I will admit that he is qualified to do that. I think that is all that he claims to be qualified to do.

Mr. Boyken: That will considerably shorten the matter.

[fol. 311] By Mr. Boyken:

Q. I just want to ask Mr. Abbett, though, what experience he has had with the oil well industry and patents that apply to that industry.

A. My practice, which is conducted under my own name in Los Angeles, is at the present time almost exclusively concerned with the oil industry. I handle the patent work for C. F. Braun & Company, which is concerned with oil refining, absorption plant work, gasoline production. I handle the patent work for Martin Decker, who makes the weight indicators used on practically all well drilling equipment. I handle certain work for Baash-Ross Tool Company, who are exclusively manufacturers of oil tools, making principally well jars. I handle oil well surveying work for Hewitt & Custer, of Long Beach, which is concerned with the problems of surveying the deviation of well bores during the drilling of wells. I have handled drilling tool work for Abegg & Reinhold of Los Angeles, and other miscellaneous clients concerned with various special tools in the industry. In connection with that work it is necessary for me not only to be familiar with the reading of patents but all of the patents on those subjects that I file in my office are prepared and prosecuted by me, and it is necessary to examine the tools, visit the wells in which they are used, and to become generally familiar with their use and operation and construction in order to properly present the cause of the clients.

Q. Have you studied the Simmons patent here in suit?

A. I have.

Q. Are you also familiar with the defendant's device?

A. I am.

[fol. 312] Q. Have you been in court during the testimony of Mr. Halliburton?

A. Yes.

Q. Since the trial of the Texas case have you made a further art search?

A. Yes.

Q. With respect to the Simmons patent?

A. With respect to the art with which the Simmons patent is concerned.

Q. Just where did you search in that connection and how was it done?

A. I had previously caused to be made in Washington a search of the Patent Office records, searching for patents pertinent to the subject, and since the trial in Texas I have had searches made of the technical literature particularly to ascertain the common practice of well-drilling at the time of the Benjamin Franklin patent, which is a patent we will be particularly concerned with here. I have also had the opportunity to make a personal search myself through the complete files of patents with which this subject is concerned in the records of the Union Oil Company, patent department, Los Angeles, and as a result have accumulated the exhibits which have just been presented.

Q. What principal elements in the Simmons patent did you search for in the prior art?

A. In searching the prior art relative to the Simmons patent I searched for a packer adapted to be placed in a well bore to seal off the materials above the packer from those below it, a valve controlling a passageway through the packer from the area sealed off below through the valve, and a pipe carrying the packer and the valve and into which the fluid passing through the passageway of the [fol. 313] valve and the packer would be introduced from the sealed off area beneath the packer within the well.

By the Court:

Q. What do you call that? Introduced from the what?

A. The sealed off area beneath the packer into the well, within the well.

By Mr. Boyken:

Q. That is, the packer seals off the two portions of the well?

A. Yes, and makes a testing zone beneath the packer and an area or length of bore above the packer within which the drilling fluid is contained and excluded from the testing zone.

Q. That is, so as to exclude the drilling fluid from the portion below the packer which is to be tested?

A. Yes.

Mr. Boyken: I think we had better take up the prior publications first because they are considerably shorter. And in doing so I want to point out to your Honor that one of the patents we rely on in this case rather heavily is a patent to a man by the name of Benjamin Franklin, and the date of that patent is 1882. It was issued August 29, 1882. That is one of the principal patents. We will come to that later on.

The Court: What is its number?

Mr. Boyken: It is No. 263,330. It is in evidence as Defendants' Exhibit H-9. I would like to pass up to your Honor the patents and the publications. I don't think you will have to give a great deal of consideration to the publications, as I will ask the witness to state the substance of them, but the patents I think your Honor would perhaps like to follow.

The Court: Very well.

[fol. 314] Mr. Boyken: The date of this publication we are first going to consider is about the time of the Franklin patent.

Q. Mr. Abbett, will you briefly state the substance of the various reports of Carll in evidence here as Defendants' Exhibit I-1 and the pertinency of these publications with respect to the subject matter of this litigation?

A. The Carll publications were prepared for the State of Pennsylvania and were reports collected in an attempt to preserve the records of the early Pennsylvania well operations and to aid the operators in further work. They show the methods used in drilling at that time. They show that it was a common thing to introduce a tube into the well to any point in its depth and the tube carrying a packer which at that time was a rather primitive affair. They called it a seed bag. It was a leather bag that was filled with seed and fastened by string onto the tubing that was lowered into the well, and when it reached the point of shut-off or seal the liquid in the well caused the seed to expand and to effect a packing action at that point.

The Carll report also shows that mechanical packers were coming into effect at that time, and by mechanical packers I mean a packer which would be mechanically set, at the option of the operator, at any point in a well and

released and withdrawn with the tubing when desired. A form of mechanical packer which is shown in the Carll publication appears as part of the exhibit, and is a structure shown in the lower part of the photostat of Plate XXXIX. And here it will be seen that a threaded connection on a mandrel was disposed below the packer to carry any amount of tubing necessary, and that a threaded connection on top of the mandrel was provided to carry [fol. 315] tubing to connect with the tubing above, and that there was a conical member in connection with the threaded member at the top portion of the tubing which, when let down against this expandible rubber sleeve, would act as a cone and spread that out in the hole to pack. Then, when they wanted to release that, they pulled up on this member, allowed the expanding cone to retract from the bore within that rubber cone, and the rubber would reduce the diameter of the packing element so that the structure could be withdrawn from the hole.

Q. What portion did you say was the packing element? By what number is that designated?

A. The packing element is designated on the photostat as No. 2, the upper element is No. 1 and the lower element is No. 3.

Q. And what portion actually did the packing?

A. Element No. 1 as connected with the string of tubing which extended to the top of the well performed the expanding action, and portion No. 2 actually contacted the wall of the formation to form the seal.

Q. Was that something like the little model that I now hand you?

A. Yes. We had a small model of this made in accordance with the photostat which I have shown your Honor and in accordance with certain patents that we found, and it shows that this device was patented November 30, 1875. The rubber packing element, referring to the model, is the cylindrical member designated in the photostat as 2. There is this cone member above it which has a threaded connection connecting to the tubing extending to the top of the well, and there is the threaded connection below the packing element which would connect with the tubing or [fol. 316] anchor pipe which extended to the bottom of the well and formed a stop for the tubing structure, so that when weight was put on at the top of the well this member would slide within that and expand it and make a packing action,

and so that when this was lifted again this member would contract to allow the entire structure to be withdrawn from the well.

Q. Does Mr. Carll in his publication state why he wants to operate a packer in a well?

A. He states why they operated packers in a well. They operated them for several purposes, as stated in this publication. One was to pack off the outer casing, which was a tubular metal lining lowered into the well, and they attempted to lower that casing to a point below the point at which water would come into the well, and then they put packers on the outside of the casing, between the casing and the well bore, so that any water that would otherwise flow into the bore from above or the strata there would be excluded from the bore that was drilled below the end of the casing and thus out of the water zone. Seed bag packers and mechanical packers were used for that purpose. Then Carll shows that they wanted to lower a tube in the well when it was necessary to ascertain whether or not they drilled a bore down below the water line in the well, and in doing that they would lower a tube, set a packer and see if they could get a flow of the well up through the tube and what that material would be. He, in connection with that matter, calls those tests. And we find specific records here of the history of various wells as they were drilled, showing, for example, on page 131, that Well No. 17 was a wet hole, which meant that it had fluid in it, which no attempt was made to exclude, and that seed bags were used at 365 [fol. 317] feet and 465 feet, at two different points. Then we come to the log of Well No. 29, which states that it was a wet hole. They found water at 13 feet, 37 feet, 53 feet, 95 feet, 400 feet and 738 feet. They found gas at 248 feet, 270 feet, 485 feet, 630 feet and 800 feet, which indicated that while they were drilling that well they were continuously exploring the territory into which the hole was being projected, and that from time to time they made some sort of an observation that there was water at those levels and gas at these points. In that well, on the same page, page 196, he states that they were drilling a wet hole and that they tested at 634 feet and again at 473 feet.

Q. Just go over those briefly. Is there any other point in the Carll publication that you desire to refer to?

A. I think I should complete the answer, completely answer the question as to the various things that Carll

shows. The other use for a packer which he shows is to use the packer on a production tube and by production tube we mean when the well is in the course of being drilled or has been finished that a tube of pipe is lowered down so that you could pump through it and cause the well to produce. And he also shows that packers were used on this type of operation to seal off the area above the packer so that they could pump and produce from the area within the well below the packer.

Q. Does this model which you have referred to correctly show the type of mechanical packer that is disclosed in the Carll publication?

A. Yes.

Mr. Boyken: We offer it in evidence and ask that it be marked Defendants' Exhibit J.

[fol. 318] The Clerk: It is admitted, your Honor?

The Court: Yes.

The Clerk: Defendants' Exhibit J.

By the Court:

Q. You said that the object of this device was to shut off the water above so that the substance below could be pumped up?

A. Through the center tube; yes. And in that connection the——

The Court: Was this tube to be placed in the well itself or within the casing?

A. It was placed within the well itself.

The Court: Was it in direct contact with the formation?

A. Yes. And, if your Honor please, we have an enlarged drawing taken from this report and it is in evidence, which shows the method and shows the packer in contact with the formation. That is the Three Oil Wells.

The Court: The rubber portion itself is not conical-shaped?

A. No. The rubber portion is cylindrical.

By Mr. Boyken:

Q. Let's take the time now, Mr. Abbett, to explain that a little more fully. Is this one of the drawings shown in the Carll report?

A. Yes.

Q. That is entitled "Sectional Drawing of Three Oil Wells." Will you explain the location of the packer with respect to that particular drawing?

A. Carll in making these drawings for the Second Geological Survey of Pennsylvania was showing the progressive types of practice at those times in the Pennsylvania fields, and he has broken away here, for sake of convenience, the drawing so that the essential parts of the structure could be [fol. 319] shown, without making a long drawing; and those spaces appearing here are of indefinite length so that these portions here are at some great distance from each other within the well bore. This shows that he has set an outer casing down here to bedrock.

Q. You are referring to Figure 1 at the extreme left-hand side, are you?

A. At the extreme left. And within that he has run a tube, through which he intends to produce, and he has his pump mechanism down here, with the pump rod running up the tube, so that as that reciprocates the oil will be elevated from the oil sand. He shuts off at a point intermediate the ground, and the oil sand is shown here in what he calls the seed bag section, and he places on there a packer which is there shown as pressed against the formation to exclude anything that might be above that packer from the area below from which he is going to produce. He selects the position of that packer as he sees fit and presses against the formation. In this particular device here, Figure 2, he has gone a step farther and has placed an outer casing which sets there or, as they say, it is landed there on that shoulder. Then he made a reduced bore the same as he made here, but in this one he put in another casing and came down here below the water, and he put a seed bag on it and also a mechanical packer. Carll explains that the reason they used those two packers was that the seed bag might eventually deteriorate, as they wanted to keep that in the well, so he packed off there and ran his tube on down the well. In this particular device the packer is used on the casing. In this particular device it is used on the tube through which any fluid from below the device or excluded area is drawn upwardly, and which [fol. 320] packing structure sets on a formation or against it. In this device here, which is Fig. 3, he merely shows another form of a well having a casing and with the pump structure in it. He has the seed bag area the same as

he has over here, the seed bag area being the area in which it was determined to pack off all of the fluid in the well above that area from the area of the well beneath it.

Q. Is the seed beg a form of packer that was known at that time?

A. Yes. It was the packer of that day. They call them seed bag packers in this literature. And then, as Carll says, some of them used a mechanical packer, which was this structure here. So at the time of this publication back in 1880 Carll shows that it was well known that packers would be placed on the tubing to exclude one length of the well from another, and that is why particularly that I have picked the Carll publication.

Q. You referred to testing with respect to the Carll publication. Does this drawing and enlargement enable you to explain that a little more in detail?

A. Yes. Referring particularly now to the bottom of page 196, Carll describes a well which was drilled at that time and said that they had about 200 feet of drive pipe that had to be driven in the island well. It happened to be on an island there. And that then they tested for two weeks, which, according to other things that Carll has said in the publication, would indicate that they placed a tube down here with a packer on it and shut off and attempted to get fluid through there either by its own rise or by pumping, and they tried for two weeks to get a satisfactory fluid. At the end of the two weeks, failing to produce oil, they went down 500 feet deeper and again tested with a [fol. 321] like result. On the next test, which was continued three weeks, it showed no oil or gas but pumped about 75 barrels of very salt water. 1,500 feet at that time, in 1866, was a very unusual depth for a well. They tested a well 1,500 feet deep at that time and made three tests and finally found it was a salt water well instead of an oil well from the fluid that they received from the bottom of the well.

Q. They were attempting to drill an oil well, were they?

A. They were attempting to drill an oil well and made three tests.

By Mr. L. S. Lyon:

Q. Did you say, Mr. Abbett, this Carll publication actually states that they used these packers in making those tests that you have just referred to?

A. It states this, that——

Q. Can you just answer that question yes or no?

A. Yes. Now, may I explain?

Mr. Boyken: Yes; certainly.

A. These tests were undoubtedly made by pumping.

By Mr. L. S. Lyon:

Q. Does it say so?

A. If they continued for two weeks and three weeks in making the tests, from the other matter that is in this Carll publication here it states that they pumped and pumped on various wells in an attempt to get the material, and they were undoubtedly made by pumping and, if that was the case, they used pump pipe, as shown in any one of those three Figures, with a packer on it and made their tests.

Q. I was just trying to find out whether in checking these publications you are saying that they actually describe [fol. 322] how those tests were made as distinguished from your telling us how you think they were made.

A. They actually describe how pumping was done and from the entire context of the material here it is my understanding that these tests were made by that pumping equipment.

By Mr. Boyken:

Q. That is what you gather out of reading over these reports?

A. Reading Carll's reports; yes. The other reports, however, definitely tell of tests.

Q. Now, proceed with the next report, which is the report to Peckham, Exhibit I-2.

A. The Peckham report was gotten out by the Department of the Interior and the Census Office of the United States, and it is the history of the production of petroleum and traces the development of oil well drilling in the United States. It is to a great extent in its history a repetition of Carll. There is, however, one example of procedure, which appears on page 6, to which I would like to call attention. That was work that was done in 1808. At that time oil wells were practically unknown. They were drilling for salt wells. And they drilled a well in which there was salt

water and contaminated material, and, not knowing that, but proceeding further, they did strike oil sand, and their attempt was to withdraw the salt water from the well and evaporate the water to obtain salt. That was in 1808. And at the bottom of that page it states the proceeding that they followed then, which is very pertinent to the present subject. If I might read the last paragraph:

"Now was presented another difficulty." That was after they had diluted the well. "How to get the stronger brine [fol. 323] from the bottom of the well, undiluted by the weaker brines and fresh water from above. There was no precedent here; they had to invent, contrive and construct anew. A metal tube would naturally suggest itself to them; but there were neither metal tubes, nor sheet metal, nor metal workers, save a home-made blacksmith, in all this region, and to bore a wooden tube 40 feet long, and small enough in external diameter to go in the 2½-inch hole, was impracticable. What they did do was to whittle out of two long strips of wood two long half-tubes of the proper size, and, fitting the edges carefully, together, wrap the whole from end to end with small twine. This, with a bag of wrapping near the lower end, to fit as nearly as practicable water-tight, in the 2½-inch hole, was cautiously pressed down to its place, and found to answer the purpose perfectly, the brine flowed up freely through the tube into the gum," which was a relatively large place at the top of the bore, "which was now provided with a water-tight floor or bottom to hold it, and from which it was raised by the simple swape or bucket."

This was a single tube which these men, without anything in advance to teach them, had made from whittling two 40-foot timbers, and they had laid them together so that they had a hole in the middle of them, and wrapped that with twine, wrapped a large ball of twine at the bottom, to make a packer, and carefully set it down in the hole to exclude the diluted brine that was in the well from the concentrated brine at the bottom of the hole, and which they wished to extract.

The Court: What did that rest upon?

A. The structure rested—the swab or string fit against the formation, and, as they carefully put that down to the [fol. 324] level they wished to reach, that wrapping of string making a swab or a packer excluded the diluted brine at the top of the well from the concentrated brine at the bot-

tom, and allowed that to flow up through the tube and the packer to the top of the well.

The Court: They had to know where they wanted the twine placed, did they not, before they started it down?

A. Yes.

The Court: They knew that at a certain place they wanted to make a seal?

A. That is right.

The Court: And wrapped the twine around at that place?

A. Yes.

By Mr. Boyken:

Q. Now, Mr. Abbett, will you proceed with the last of these three publications, which is Chamberlin, Exhibit I-3?

A. The last of the publications is the Fifth Annual Report of the United States Geological Survey to the Secretary of the Interior, in 1883 and 1884, and was printed by the Government Printing Office in 1885.

Q. What is the materiality of that publication to the issues in this case?

A. That publication was substantially concurrent with the issuance of the Franklin patent, which was 1882, and described drilling methods at that time. The Chamberlin report is discussing artesian well drilling, and he shows on page 157 the old seed bag packer, and on page 158 he shows a mechanical packer, which is of a type adapted to engage the wall of the bore in which they are drilling, so that the upper tube could be rotated with relation to the other, screwing the two members together, and compressing [fol. 325] a series of rubber discs, so that they would expand and make a seal.

Q. Will you show the Court the illustration of the hook wall packer as it appears on page 158 of that publication?

A. At the left hand the different parts of the packer are disassembled and laid out here, so that here is the upper part and its shoulder, and here is the threaded member which screws into the lower end of the upper part, and upon which threaded member this series of rubber discs are placed one after another, as shown in the right-hand view. The shoulder at the lower end of the threaded extension permits the downward movement of those discs. On an extension beneath the packer structure are a pair of spring members, which extend outwardly and engage the wall of the well bore, so that they would be substantially held

against rotation and the tube extending to the top of the well may be rotated, to screw this member down and compress those packing rings into the well bore to make a seal, so that the area below that packing structure down here in the well would be sealed off from the area above the packing structure.

The Court: Did you say that was the Geological Survey report?

A. Yes. And that was a mechanical packer, as shown then.

By Mr. Boyken:

Q. Now will you please resume your seat. Is there anything said in that report with regard to tests?

A. Yes. That report says considerable about tests, and has a paragraph on page 159 which discusses the detection of the flow. That is the title of the paragraph. In that [fol. 326] paragraph it says: "It is a matter of some practical moment, therefore, to know when a stream is struck which may yield a flow at the surface when put under proper control." And then he proceeds to describe three tests or methods of testing to determine the condition of the well and what is done, and we have enlarged the cuts from this publication, showing Figures 28, 29 and 30. The first figure states that it is a section of a well illustrating a negative test. Now then, what he says he does is to introduce a tube into the well bore carrying a packer, and he attempted to make a test at the point above the strata "A", and sealed off the formation above. He says that is a negative test, because he had a formation "A" and one "B", and when he sealed off here the fluid from the section "B" went into the formation "A", and he didn't get any flow at the top of the well at all, so the test was negative.

In Figure 29 it shows a section of a well, showing a partial and misleading test. In this particular case he set his packer,—he can set it by selection, moving it up to any point he pleases. In Figure 28 he set his packer above the strata "A." In Figure 29 he set it between "A" and "B", and, this done, he had a test of "B", but he knew nothing of "A". And the fluid from the formation flowed upwardly through here and out here, and he got his test sample. Figure 30 is a section of a well illustrating an inverted test. In that particular instance he shut off between "A" and "B",

and the well filled, due to the particular formation in which they were testing. In the conclusion of the article Mr Chamberlin says, on page 162: "These examples, while not exhaustive of possible cases, illustrate the nature of defec- [fol. 327] tive tests and the deceptive conclusions liable to be drawn from them. The remedy is manifest. Test each water-bearing stratum as it is encountered, or else vary the final tests so as effectually to exclude all liabilities of error."

Q. Now will you take up the patents, Mr. Abbett, and describe each one briefly? Those patents are in evidence now as Defendants' Exhibits H-1 to H-16. Take up the first patent, which is Defendants' Exhibit H-1, the patent to J. C. Lyon or Lyons, No. 46,124, the first one in order in the group of patents. Now, briefly describe that. Take Figure 1 of the drawing.

A. As indicated on the drawing, Figure 1, the title of the invention is, "Testing Oil Wells." The patent was issued January 31, 1865. At the time this application was filed in the Patent Office it was sometimes necessary to file models in the Patent Office, and the application in this case describes a model by which he discloses his invention, and he says that this member B is a block representing the earth in which the hole is to be made, and that A is glass, a glass tube, which would represent the well bore, and that he wants to make a test to determine what fluid is in the well at any point and explore that well, and illustrates a packer H and a packer G, which were flexible packers, they were bags that would be filled with fluid so that they would expand when the fluid was poured into them from the top of the well, and they would create a selected test, shown between those two packers, this one and that one. He would then either allow the formation pressure to flow upwardly through here, so that he got his sample or an indication of the well which he was testing, and if that pressure was not sufficient he augmented it by introducing air down through a pipe here into that zone, which would increase the pressure in [fol. 328] the zone, and then elevate any fluid that was in the tested zone, so that they could ascertain what it was. Mr. Lyon says, in talking of the packers which were used in place of the old seed bag, on page 2, beginning with line 3: "They can at any time be changed in their position in the shaft of the well, or taken out of one well and used in another, without any damage to the apparatus, which is not the case with the seed-bags."

So he had a testing device which he had intentionally made portable, to take from one well to another well to make tests, and he had it made so that he could control the packers and change their position in the well and test at any level he desired, excluding all of the rest of the length of the bore from the tested area, either above or below.

Q. You say there is a testing zone which appears between the two packers?

A. Yes.

Q. And you also mentioned two pipes. Are those two pipes one within the other, in order to relieve the fluid from the testing zone?

A. Yes. These two pipes, this pipe E is extending through the pipe B, and spaced from it, so that normally the fluid in the formation would move up in the intermediate space, and then, if there was not sufficient pressure in the formation, he allowed air to come in here and increase that pressure in the zone from there to there, so that the material would be elevated by the added pressure.

Q. There is another pipe which seems to be marked "F" on that drawing. What is that one for?

A. That pipe is the pipe through which fluid is delivered to the packer H and the packer G, to inflate them.

[fol. 329] Q. What is the patent entitled?

A. "Testing Oil Wells."

Q. Is there anything further you care to say with respect to the disclosures of that patent?

A. Other than he states that, "The object of my invention is to find where water, oil, and gas veins or fissures are, and to effect a cut-off above and below at any desired point or place in the walls of oil wells."

Q. That will be sufficient, Mr. Abbett. Will you please resume your seat. Now, take up the next patent, the Latham patent, No. 56,234, dated July 10, 1866, and briefly explain the disclosure of that patent, with particular reference to Figure 1.

A. The Latham patent has been selected because it shows substantially the packer illustrated in the Carll literature, of which we had the model a few moments ago. It is only shown to illustrate that back in 1866 they were issuing patents on mechanical packers, which, in this particular structure, shows, by reference to Figure 1, an upper tube A extending downwardly, with miscellaneous fittings on it, to a conical member D, shown in section, which will penetrate

within the bore of the packing member E, and as it is lowered down will expand that packing member E to effect a seal. When that conical member D is lifted the packer can contract and be moved to other parts of the well or entirely withdraw from it.

Q. Is there any reference to oil wells in that patent?

A. Yes. The title of the patent, as given on the title page, is, "Improvement in Oil Well Tubes."

[fol. 330] Q. Now please pass on to the next patent, to Kewley, No. 58,837.

A. The Kewley patent is called by a term that we found in the literature here, "Stop-waters for oil well tubing," which was a very proper description, as the packer was at that time intended to stop off the water so that operations could be conducted beneath. This packer is operated by two members, which screw one within the other. The upper one is connected with the tubing of the well, so that it could be screwed and rotated, and the lower one is held against rotation, as particularly shown in Figure 1, by these wings beneath the packing element, which would stick out into the wall and prevent the lower section from rotating. As the upper tube section was screwed down the packing element E would be compressed and expanded. It is interesting to note that in this connection Mr. Kewley, in 1866, wanted to make rotation of his pipe as easy as possible, and he introduced between the two shoulders J and I, where the pressure would be exerted, a bearing structure, an anti-friction bearing structure, which has a cage or a set of rings carrying a series of rollers, which are positioned between those two pressure faces and relieve the friction, the same as Mr. Halliburton has done in his stop cock and gear device.

Q. Will you be good enough, Mr. Abbett, to point out to the Court the anti-friction bearing which is immediately above the packer?

A. It is designated generally by the letter "J".

Q. What figure do you refer to?

A. Figure 1.

[fol. 331] Q. Figure 1, and it is designated as "J," and that is above the packer E?

A. It is.

Q. And those little wheels, what are they, as they appear in Figure 1?

A. Those little wheels are more clearly shown in Figure 4 where there are seen to be a series of wheels mounted on spindles, so that they can rotate freely, and their diameter is such, as shown in Fig. 1, as to separate the collars G and I, so that there would be no bearing action of the retaining ring J on them.

Q. Is there a tube or pipe utilized in connection with this structure?

A. Yes; a tube or pipe is connected above the device, and it is attached by a threaded connection to the member B. It may also be that a tube or pipe is connected below the device to the threaded connection D.

Q. I am referring to the tube that is above, which is connected, as shown in Figure 1, at the point marked A, which is the top of that figure, I believe. Now, is that pipe rotated in order to operate this device?

A. Yes; it is rotated from the top of the well. That is the way you would set the packer and release it.

Q. The rotation is at the top of the well, and that is for the pu-pose, as I understand it, of setting and releasing the packer?

A. Yes.

Q. What is the packer for—to seal off the two portions of the well?

A. Yes; the packer is in order to seal off any selected area of the well from a lower selected area.

[fol. 332] Q. Does that tube or pipe pass downward through the packer?

A. Yes; there is a communication directly through the packer.

Q. So that the formation from the area below the packer may flow upwardly through the pipe, to the top of the well?

A. Yes.

Q. Now will you pass on to the next patent, which is to Burr and Wakelee, No. 68,350, and briefly explain the structure and operation of that device as shown in the only figure in that patent drawing?

A. The Burr and Wakelee patent is entitled "Improvement in Apparatus for Testing Deep Wells." It was issued in September, 1867. On page 1 it gives the object of the invention, when, in the second paragraph, it is stated: "The nature of our invention consists in proving an apparatus that will, in the first place, explore and test the properties

of the well at all points from top to bottom, and enable us to ascertain the exact locality of each and every siphon or mineral vein in said well. Secondly, when the exact locality of the desired vein or siphon is found, by the mechanical operation of this invention, hereafter described, we are enabled to shut off everything foreign to the object sought for, both above and below, thereby enabling us to apply the whole force of our suction directly upon the object, whether oil or mineral-water.''

Q. Now, Mr. Abbett, I don't want you to read any more. The Court can read that. But I want you to explain the thing with reference to the drawing. I understand your explanation is based primarily on that paragraph, which [fol. 333] is the second paragraph of the patent. Now, going to the drawing, show us how that operates.

A. In the drawing there is a tube A which extends from the top of the well downwardly, and, mounted on that tube A, in the drawing are shown two packing elements B. In the description, in the specification, it says that it is necessary, when making a test through the bottom of that tube A, that it is only necessary to use one packing element, but in the drawing it shows the use of two packing elements, so that the area between the two elements may be sealed off from the entire remaining length of the well. This sealing off is done mechanically by operation of the lever shown at the top of the tube in that view, and which, when pulled, will cause pressure to be applied on the intermediate lever shown mounted directly between the two packers, so that the packers will be simultaneously acted upon by pressure to expand and hold a positive seal against the formation. There is a small opening shown at K. It is rather difficult to see.

Q. Will you point out that opening at K? It is very difficult to see that. Will you point it out?

A. It is in the tube A just above the lower packing structure B.

Mr. Boyken: Does your Honor see the opening K?

The Court: Yes, I see K.

The Witness: And fluid from that selected zone is drawn into that opening.

The Court: Where is the opening?

Mr. Boyken: Designated as K.

The Witness: There is a hole right where my finger is.

The Court: Is it marked?

[fol. 334] Mr. Boyken: Yes. If you will permit the witness to put his pencil on the small hole.

The Witness: It is very difficult to see the letter, because the letter is right in the hole.

The Court: All right. You cannot see it if it is in the hole.

The Witness: There is the K. (Indicating.)

The Court: That indicates the opening?

The Witness: Yes.

The Court: All right.

The Witness: That is the opening. So that there is a communication through the tube to that area being tested.

The Court: Through the—

The Witness: Through the wall of the tube. That opening is in that pipe A which is extending clear to the top of the ground.

The Court: And you mean that that allows any substance to come from the outside of the pipe into the pipe through that opening?

The Witness: That is right.

The Court: I see.

The Witness: And the test is thus obtained. The patent says that the lower end of that tube below the packer B, which is shown as threaded there, is closed while they are making a test through the opening K. But if they want to they can close the opening K and make a test through the lower end of the tube, below the lower packer B. In one place the patent is called an oil pump, and in the other place it is a testing apparatus for deep wells. It apparently tests by pump action to suck up the specimen being [fol. 335] tested, if there is not sufficient pressure in the formation to carry it to the surface.

Q. Now, Mr. Abbett, let us go over that briefly. You say this is a testing apparatus for deep wells?

Mr. L. S. Lyon: Did he say "deep"?

Mr. Boyken: Yes; the word "deep" is in the title. The title is "Improvement in Apparatus for Testing Deep Wells."

The Witness: That is what the title is.

Mr. L. S. Lyon: Does he say that is deep in the modern sense?

Mr. Boyken: Well, I don't know.

Q. How deep would it be as of 1867?

A. According to these Government reports and records here, wells were running from 1500 to 2000 feet at that time. That was a deep well, I would say from those reports.

Q. This patent discloses the use of either two packers or one packer; is that correct?

A. Yes.

Q. In the case of the use of two packers is there a restricted testing zone between the two packers?

A. There is.

Q. And that is shown in the drawing which is a part of this patent?

A. Yes.

Q. The fluid that is in that restricted zone, is that capable of entering the pipe and passing upward to the top of the well hole?

A. Yes. It is intended that it shall be taken upwardly through the pipe to the top of the well bore.

[fol. 336] Q. Suppose you use the alternative form disclosed in the patent, namely, the use of a single packer, in that case how does the fluid reach the top of the well?

A. The fluid would enter the lower opened end of the pipe A.

Q. And the single packer, in such a case, would be the lower packer B shown in that drawing?

A. Yes.

Q. And then the fluid would pass through the pipe, which pipe in turn passes through the packer and up to the top of the well?

A. Yes, sir.

Q. By the way, was that patent and the previous patents referred to by you so far cited against the Simmons application during the time it was prosecuted in the Patent Office?

A. They were not.

Q. Please pass on to the next patent to John F. Carll, No. 73,577. Is that the same Mr. Carll who made these reports?

A. Yes; he is the same Mr. Carll who made the reports for the State of Pennsylvania, as mentioned in the publications. His patent was dated 1868. And in the light of those publications it shows that Carll used a structure of this type which was a sand pump for making tests.

Q. Just a moment. What do you mean by a sand pump?

A. A sand pump, as distinguished from a tester or a bailer within which material might be obtained, like in buckets, is a container which is lowered, without any packer on it, down through the fluid within a well, and has a valve of some sort in it which can be opened at a predetermined [fol. 337] time, mostly when the sand pump strikes the bottom of the well, and that weight would open the valve, thus establishing communication with an empty chamber within the pump. In an oil well or any other well the column of fluid in that well exerts a definite pressure. Just roughly speaking, you can figure that there is a half a pound of pressure exerted for every foot in length of pipe. So that, if a well was 2,000 feet deep, at the bottom of that well there would be 1,000 pounds of pressure. And the handling of it, incidentally, is one of the problems with which we are concerned. When that valve in the sand pump opens at the bottom of the well the pressure of that fluid on the outside will instantly rush in to the empty chamber, carrying with it all the debris, the cuttings and parts of the drill due to its force and lifting action, and the valve closes and they pull the sand pump out with that material entrapped in it. That is the usual operation of the sand pump. This particular sand pump of 1868 had a valve in it and a rod H extending downwardly and encountered the bottom of the well bore so that it tripped by a mechanism I will not describe and released this valve element D at the upper end of this piston rod within the cylinder, and when that was released the fluid adjacent to it, due to the pressure of that weight of water in the well, would be forced into it and the valve at the lower end of the pump, which is here shown as an inclined member leaning against the rod H, merely a flapper, would close and entrap the sample.

Q. Just a moment, Mr. Abbett. Let's go over this a little more slowly and in more simple language. This is a sand pump for oil wells, is that correct?

A. Yes.

[fol. 338] Q. Why did they want to obtain specimens of the sand in oil wells?

A. They wanted to ascertain from such materials as they found at the bottom of the well in what strata or through what materials they were penetrating.

Q. Was there also fluid there in addition to the sand?

A. There had to be in order to cause the sand pump to operate.

Q. So that this device was set down through fluid with the idea of entrapping the sand and fluid at the point to be tested?

A. Yes.

Q. It embodies a chamber for entrapping a sample?

A. It does.

Q. And that sample chamber is the whole device, the outside of the device, shown in Figure 1?

A. Yes.

Q. How many valves are there in that chamber?

A. In the chamber or the entire structure?

Q. In the entire structure.

A. There happen to be three valves in it.

Q. What does the bottom valve do? What is the purpose of that?

A. The bottom valve adjacent the mouth of the device is a flapper valve just like a leaf that would lie down over a hole to close it.

Q. Does that entrap the sample?

A. It does.

Q. That is to say, Mr. Abbett, after the sample is in the chamber that lowermost valve closes?

A. Automatically; yes.

[fol. 339] Q. Automatically?

A. Yes.

Q. And then when you have the sample in that chamber with the lower valve closed what is done with respect to the chamber?

A. It is raised from the well and emptied and then its contents observed, according to Mr. Carll's publication.

Q. While that sample chamber is at the bottom of the well what action is it that makes the sand and fluid there go inside of the chamber?

A. The weight of the column of liquid within the well.

Q. That fluid and sand rush into that chamber while the test is being made?

A. Well, the valve D, of course, has to be tripped before it will go in.

Q. And what causes that to trip?

A. When the tube H encounters the bottom of the well and the structure is further lowered.

Q. Will you tell us for what particular purpose you selected this patent?

A. I selected this patent originally because it showed a test, or it showed a chamber within which fluid from a well would be contained, and it described that that sand pump or chamber structure was carried on an augur bit, which was a rigid member, and that when the structure was lowered into the well the valve would be released so that it would open by the downward movement of the sand chamber while the member H was being held stationary as it encountered the bottom of the well, and the downward movement of that structure released and permitted the valve in the sand chamber to open.

[fol. 340] By the Court:

Q. What is the purpose of the upper valve?

A. The upper valve was as a relief valve. The space above the member D, which is a movable member that would move up, is filled with air, and, if an excessive pressure is in that chamber when the member D moves up, they have provided a valve, normally held inwardly by a spring, which would allow that air to pass out in the well bore and allow the sample to come in. There would be no resistance of the air otherwise compressed in that upper part on the upward movement of the valve member D.

By Mr. Boyken:

Q. Please take up the patent, very briefly, to Birge, No. 182,098.

A. The Birge patent is merely a valve structure for a sand pump. This structure, as shown in the Figures of the drawing, is screwed onto the lower end of the tube, which is the sand chamber corresponding to the chamber in Carll, within which they are going to entrap the material. And in this structure we have a stop cock type of valve, that is, as shown in Figure 3 of that drawing, we have a rotary valve element which establishes communication from beneath it to that tube above it when the part—

The Court: You had better begin again. I have lost the thread of your statement.

A. All right.

The Court: Perhaps you can indicate it on my copy.

A. In the Birge patent this is a valve structure for sand pumps. This is the lower end of the sand pump.

[fol. 341] By Mr. Boyken:

Q. You are referring to Figure 1?

A. Yes, sir. There is a tube to which it is attached and within which the material is trapped that extends up here, but it is not shown here, as he didn't think it was necessary because those tubes were being used, as Carll says, as high as 20 feet long. And what he wanted to do when he got to the bottom of the well, the same as Carll, was to permit the fluid to get into that tube above. So he provides a valve of the stop cock type, which is a cylinder that is rotatable. It is round and it rotates in this member, which is a sleeve B, and stands transversely of it. There is a passageway in that sleeve down to the point at which this cylindrical valve member is seated and a passageway beneath the sleeve, and when that valve element C is in the position shown in Figure 3 there is a full flow of material right up into the pipe. When that valve member would be in a crosswise position that opening would be interrupted. The way that the structure operates is that this lower member here is slideable, that is, moves up on that member, and the end of this valve is fitted with a gear which engages those gear teeth, and as you move those toward and away from each other it will be seen, as those teeth move up, this valve will rotate in one direction and when you move back that valve will rotate in the opposite direction, either to an open position like this or a closed position at right angles to it. There is a spring in the bottom of the member A which normally holds the members A and B in their separated position. The patent explains that in that position the valve is closed and that that is the way he intends to go in the hole. And when he gets down he lets the weight of that sand pump tube come [fol. 342] down and it would telescope within this member here, causing the valve C to rotate and to open, and that when he lifts the weight the spring will separate the member B from E, causing that valve to close again, and he withdraws the structure from the well. He states that the motion of the valve is positive; does not depend on the pressure or action of the sand and water to operate; that it is more effective in its operation and will remove a greater capacity of sand.

Q. Is there anything said about this device being intended for use in connection with oil wells?

The Court: It says it is an improved sand pump for oil wells.

Mr. Boyken: Yes; in the Pennsylvania field, I believe.

The Court: I think it is the shortest patent on record. Is it not?

Mr. Boyken: That is one of the good qualities about this patent, your Honor.

Q. Will you now take up the patent to Koch, No. 208,610?

A. The Koch patent is merely produced to show the practice of having an enlarged bore in the well at its upper end, a reduced bore E, and that it was common knowledge at that time, as shown in this patent, to have a packer that set on the shoulder, which would occur at the point of reduction of the bore.

Q. Does that show a "rat-hole," as we have been terming it in this litigation?

A. Yes; that would show a "rat-hole," the reduced bore below a larger bore above.

[fol. 343] Q. And that "rat-hole" is packed off from the upper portions of the well, is it?

A. It is.

Q. Please take up the next patent to Dower, entitled "Oil Well Packer," No. 249,228.

A. The Dower patent shows a packer mounted upon the tube of a well and which is mechanically set by lowering the upper tube section against a cone, the same as we previously described, to expand that packer against the wall of the well.

Q. What figure shows that?

A. That is shown in its non-expanded position in Figure 1. And in Figure 2 it shows the cone lowered into the packing element I, I believe it is, to expand and set against the wall of the formation.

Q. That is an oil well packer, is it?

A. It is an oil well packer. And Dower explains that he wants to use this in order to shut off different sections of the well and exclude the material thereabove and permit the material beneath to come up through that tubing. This Dower packer, along with others, shows that it was common knowledge at that time to mount a packer on the tubing of the well.

Q. Does it say anything with respect to flowing in connection with an oil well? I call your attention to paragraph 2 of the first page.

A. Yes. Paragraph 2 mentions the flowing of an oil well.

Q. How does that oil well flow in connection with the drawing of that patent?

A. It may flow by the pressure within the confined area below the packer or, as he has explained in Figure 3, he may [fol. 344] proceed and lower a pump structure into it and pump, putting the well on production.

Q. Is there anything said with respect to jarring in order to release and remove the packer? I call your attention now to page 2, two paragraphs just preceding the first claim. Please explain that.

A. He states there that "As a further advantage to be gained by my construction, the vertical play of the section C inside the section D——"

Q. Don't read it all. Just explain the significance of that.

A. Well, he mentions jarring. That would be that you could jar this loose.

Q. Let's take up the next patent, which is the Benjamin Franklin Patent. That is No. 263,330, entitled "Device for controlling and regulating the flow of oil wells," dated August 29, 1882. Did you have an enlargement made of the drawing of that patent?

A. I did. On the easel here is an enlargement of the Franklin patent, the entire drawing as appears therein.

Q. I wish you would refer to this enlargement of the drawing of the Franklin patent and describe the structure that is there shown.

A. The Franklin patent is a device for controlling and regulating the flow of oil wells. It includes a valve structure, at the upper end of which is a pipe A-1 which is connected with the tubing coming down into the well of any of the types of tubing that we have seen this morning. This tubing which connects with A-1 extends to the top of the well. The member A-1 extends downwardly and has an enlarged cylindrical portion on its lower end. At the bottom of the cylindrical portion is what we might term a partition [fol. 345] that extends across it and has an opening in it of semi-circular form, as particularly shown in Fig. 3 of the drawing, that view being a view showing the lower end of the member of which A-1 is a part and looking upward. The concentric hole, shown in Fig. 3 as being smaller than the

outer diameter, is the passageway upwardly through A-1, which is partly obstructed by this partition across here which has that opening in it. Below that partition is a disc and that disc is circular and is shown in Figure 5. It has a semi-circular opening in it substantially the same size as the semi-circular opening shown in the end partition C shown in Figure 3. The disc is mounted on a seat, which is here indicated as forming the upper flaring part of the tapered portion B. The patent says that the disc may be secured rigidly to the seat or that it may have slight vertical movement, as indicated here by the space appearing between that portion there and the seat and possibly by the reference numeral b-2 with the lead line. The specification says that the disc may be separate or fastened and formed integral with this part down here. But he shows it in the drawing as having this slight relative movement. Since it is fixed in there in that manner and can float slightly, he must prevent its rotation relative to the seat on which it sets, and he makes two holes in it, p, on each side, as shown in Figure 5. He has a pin that comes upwardly from the seat and sticks into those holes so that the disc may float up and down but cannot rotate. The seat of the member B has a threaded outside portion which has an upward cylindrical flange completely covering what would be the joint between the disc D and the disc C. Surrounding the threaded portion of the member B and threaded thereonto is this outer cylindrical [fol. 346] housing or cage B′, which is fitted with an annular flange that runs entirely around the structure, as indicated at b′ and is screwed down on the upper edge of the cylindrical threaded portion of the member B. It will be noted that the portion C is housed within the member D′, and that it has a flange which extends outwardly, and under the flange on the member B′, so that the members C and A′ will be held against movement. It is also noted that the enlarged portion C is within the member B′ and confined also by the end wall of the member B′, so that it could not pull out there. The upper edge here of the end wall of the member B′, in addition to having a cylindrical opening through it, also has on one side a cut away portion, as generally indicated in Figure 4, which is engaged by a key extending upwardly from the end face of C, as we will show you on the model, so that the tube A′, with its associated parts, including the partition member c, rotates from the position where the key carried by the member which is supposed to be in the struc-

ture of Figure 4, but is here removed, so that the key will form a stop, and the member A′ with the member C and the partition indicated by the reference numeral c, may rotate a half a turn one way or the other. When it rotates in one direction the opening in the member D will be matched with the opening in the member C, and at that time, as shown in Figure 2 of the drawing, a flow of fluid from the member A upwardly through B, through the matched opening, can take place into the member C, through the member A′, and up the tube. When it is rotated a half turn to the other stop these members will move from their matched position, and the solid portion of the disc C and the solid portion of the disc D will be disposed so that they close the opening in the [fol. 347] opposite disc with which they are matched. So that the opening which would otherwise occur between the matched openings of the two discs would be closed, as shown in Figures 1 and 2. That is the structure of the device shown in the drawing.

Q. Just a minute, Mr. Abbett. May we call that a valve structure?

A. That is a valve structure, which is controllable by rotation of the pipe attached to the member A′ extending to the top of the well, and as it rotates it will rotate to match the holes in the two valve elements, which are working on a common axis, to a position where flow will be established through them, or to a position where flow will be completely interrupted.

Q. Then, as I understand it, you rotate the pipe at the top of the well to open and close the valve; is that correct?

A. That is correct.

Q. And the valve is in a casing of some sort?

A. The valve elements exactly are the two disc members, the one being formed with the member C, and indicated by c, and the other by the member D, as shown in the drawing, and the remainder of the structure provides a protecting housing for those two valve elements and a seat for the lower valve element or an attachment for the lower valve disc.

Q. Is there anything said in the Franklin patent about a packer?

A. Yes. The Franklin patent describes this as a flow device or a device for controlling and regulating the flow of an oil well, and he says that this structure is carried by

the tubing, is preferably placed deep in the well, and is preferably mounted above the packer.

[fol. 348] Q. I am reading from page 1, line 16, of the patent, where it says, with reference to the device: "But preferably within, at a point above the packer." What is meant by that, Mr. Abbett? Where would the packer be located on the Franklin device?

Mr. L. S. Lyon: I object to that, your Honor. The witness should show where in the patent there is a disclosure as to where the packer is.

The Court: That is what you are asking him, isn't it?

Mr. Boyken: Yes. I just read that. It says that this is located preferably within at a point above the packer.

Mr. L. S. Lyon: There is no statement that this packer is on a string of tubing.

Mr. Boyken: We don't pretend that it is. Packers are old in the art, as your Honor knows.

The Court: He may answer.

Mr. L. S. Lyon: If your Honor please, I want the witness to point out where the patent states the packer is. It is our contention, so your Honor will understand the objection, and it is so held by the decisions, that the packer that is referred to here is not a packer that is on this string at all. It is a packer that is in the well, and packers were used as seed bags in place of cementing on the casing in the well.

The Court: There is no packer indicated on that?

A. There is no packer indicated on this drawing. The only statement relative to a packer in the specification is that this structure is placed above the packer, which means that the packer is below the valve.

[fol. 349] Mr. L. S. Lyon: I object to the statement of the witness as to what it means. My point is, and the courts have found, that there is no warrant for inferring from that statement in the patent, in view of the practice in the art at that time, that that is a packer on this pipe at all, either above or below.

The Court: Does it mean a packer on that structure itself?

A. I don't say that. I say the patent says that the valve is placed in the well above the packer. I am not saying at

the present moment where the packer was. All I am saying is that in the other prior art that we have shown here that there was a packer on the tubing.

Mr. Boyken: I will reframe it.

Q. Calling your attention to the portion of the patent which I have just read, that is to say, page 1, commencing with line 14, where would the packer be located with respect to the valve structure shown in the Franklin drawing?

Mr. L. S. Lyon: That is the question we object to.
The Court: Do you mean where might it be located?
Mr. Boyken: It says "preferably at a point above the packer." Now, I want to know what is meant by that language.

Q. What does that mean to you as a person reading this patent?

Mr. L. S. Lyon: That is objected to as not a proper test. This witness knows what this invention is and so does the court. It is impossible to divorce that from your mind. The question is not what this witness can say that can mean [fol. 350] but where is there any statement in this Franklin patent that makes the disclosure.
Mr. Boyken: I just read it, Mr. Lyon.
The Court: It says it might be placed above it, doesn't it?
Mr. Boyken: Yes, your Honor.
Mr. L. S. Lyon: But it doesn't say that packer is on this pipe at all.
The Court: Answer the question.

A. Will you please read it, Mr. Reporter?

(Question read by the reporter.)

Mr. L. S. Lyon: The witness can't possibly answer that, if your Honor please.
The Court: Answer the question.

A. I will answer it by quoting from the patent itself, that the valve is above the packer deep in the well. That is what it states.

By Mr. Boyken:

Q. With the crayon that you have in your hand just indicate where the packer is located.

Mr. L. S. Lyon: We object to that. This is a pipe in a well which has other pipe in it, or may have other pipe in it, and there is nothing to warrant this witness placing this packer on this pipe at all.

The Court: I don't see the necessity for indicating it.

A. In all fairness, I will just say that, since there is the valve above that dotted line, the packer is below it, and that is what the patent says.

By the Court:

Q. That is what the patent says?

A. Yes; that is what the patent says. It doesn't say that it is on the tubing or off of the tubing. It says it is down there.

[fol. 351] By Mr. Boyken:

Q. Where is the whole valve structure located with respect to the well, according to the patent?

A. The patent says that the valve structure is preferably placed deep in the well.

Q. Does that mean it is in any kind of fluid?

Mr. L. S. Lyon: I object to that. The question is what does the patent say.

The Court: I don't see how he could say but, nevertheless, he may.

Mr. L. S. Lyon: It also says this thing may be at the top of the well.

The Court: Answer the question.

A. By "in any kind of fluid" do you mean the valve or the packer?

By Mr. Boyken:

Q. I am talking about the valve structure and the packer, both.

A. I wouldn't know from the patent whether it was in the fluid or not.

Q. What about the packer?

A. The packer must have been in the fluid because it was a packer there to pack off a section of the well.

Mr. L. S. Lyon: I object to that. There is no such statement in the patent.

The Court: The objection is sustained as to that.

By Mr. Boyken:

Q. What do you understand by the use of the word "packer" in this Franklin patent?

A. By the use of the word "packer" I understand any of the structures in the prior art, which we had this morning, which were devised to shut off one section of a well from the other.

[fol. 352] By the Court:

Q. Where do you find that in the patent, the reference to the packer?

A. There is no definition of a packer in the Franklin patent.

By the Court:

Q. I mean the language you just read.

Mr. Boyken: That is on page 1, your Honor, the first column, line 17, where the word "packer" appears.

Q. I am going to ask you to compare the structure shown in the Simmons patent in suit with the structure shown in the drawing of the Franklin patent, both enlargements being before you.

A. In the Franklin patent we have the member A-1 which connects the tubing extending to the top of the well.

Mr. L. S. Lyon: I object to that. The Franklin patent says that that thing may be at the top of the well.

Mr. Boyken: I object to these interruptions, if your Honor please. They are merely arguments of the case.

The Court: There seems to be overlapping objections here. Go on with the answer.

A. In order to try to clarify that matter, the Franklin patent states that this device could be used in two ways. One would be a valve that would be at the top of the well and the other would be a valve which would be deep in the well and which you would rotate by the tube. Taking the comparison of the valve deep in the well which would be rotated by the tubing, and so there will be no confusion, I will state that the portion marked A′ is connected to that portion of the tubing which extends from the top of the well to it; that in the device of the Simmons patent, as

shown in his drawings, the member which he has desig- [fol. 353] nated as 19, the upper cylindrical member, is attached to the tubing which extends to the top of the well, and that in both instances the members attached to the tubing are rotated by rotation of the tubing. In the Franklin device the upper valve element, which is the partition member c, is formed with a semi-circular opening through, it through which fluid may flow. In the upper packing element 19 of Simmons it is formed with a passageway, or a pair of passageways, here indicated in this perspective view in Fig. 3 as 17, that come down through it and through which the fluid flows, the same as it does in the structure shown in Figure 4. Below the members C and A′ of the Franklin patent, which are attached to the portion of the tubing above, is a valve element shown in the Franklin at D and which is complementary to the valve element c, and it has an opening through it which would match with the opening in the upper member with relation to which it rotates. In the Simmons device we have the element marked 4, which is the lower valve element, and that has passageways 5 through it, agreeing with the passageway through D, and when the upper element is rotated the passageways 5 and 17 will be moved into positions of alignment, as shown in Figure 1, or to positions of misalignment when the valve is closed. In the Franklin device there is an arcuate slot around the top of member B′, within which a stop member carried by the member C moves, and that limits the amount of rotation of the upper member with relation to the lower member to rotate the structure from a full closed position to a full open position and back. In the Simmons device, as shown in Figure 1, there is a slot in the upper member which extends around the edge of it and which receives a pin carried on the lower member, and [fol. 354] that, likewise, limits the rotational movement of the upper member 19 with relation to the lower member 4, so that at the end of that movement, as limited by the pin 23, the ports 17 and 15 will be moved to positions of alignment or out of position when the valve is closed. The lower valve plate D of the Franklin device is fixed with relation to that portion of the structure indicated by B and the pipe there beneath, so that when the upper member with the tubular extension A′ and the tube connected to it are rotated the upper member with its openings will be

able to move relative to the lower portion which is held stationary. In this particular device, the Simmons device, it will be seen that the member 4, which is the lower valve element carrying the passageways 5, has an extension which they call a mandrel and through which the passageways 5 continue. On that mandrel is mounted a packer which is pressed against the formation of the well, holding that lower member stationary, so that the upper member can rotate with relation to it when the pipe 23 is rotated.

By the Court:

Q. How is that held stationary?

A. By fitting in to the seat in the well bore, which I might indicate here, this being the "rat-hole" and coming up this way and that being the large bore of the well, and that packer fits in that seat to form the seal with which we are concerned between the fluid which is up here and such formation fluid as is down below there. And when that fits into that seat, and it must fit in there firmly, then this lower portion is held against rotation and the upper part may rotate if the parts are so adjusted that they will not stick. In the Franklin device this portion down here must be held by something in order that the upper valve [fol. 355] element may rotate with relation to the lower valve element and move these parts shown in Figure 3.

Mr. Richmond: Your Honor, I object to that unless he points out in the patent where it says that is true. I don't think he has any right to plead this patent and then put his own interpretation on it and read into it things that are not in the disclosure of the patent. And I move to strike out that last statement.

The Court: I think that objection is good. The patent itself does not state that, does it?

A. The patent does not state the obvious, which is that one part must be held with relation to the other in order to bring those parts to match or not to match.

By the Court:

Q. What about the Simmons patent in that respect?

A. I think that the Simmons patent—I don't know.

Mr. Boyken: It is obvious from the structure.

A. Even in Simmons it is, of course, understood and no one will deny that that packer is supposed to set in there firmly and against rotation. I think that is a fair statement of it.

Mr. Richmond: It shows it and discloses it but the Franklin patent does not.

Mr. Boyken: It does.

Mr. Richmond: I say that Simmons discloses that it is held there and describes it. It is in the patent.

Mr. Boyken: And it is very obvious from the Franklin patent also, your Honor.

Mr. Richmond: It is not.

Mr. Boyken: I say it is. But there is no use having an argument about it now.

[fol. 356] The Court: We ~~will settle this~~ right now. Mr. Richmond, find in the Simmons patent where that is shown, and then the witness will show in the other patent where it is shown there.

Mr. L. S. Lyon: I think that throws some light on those words "positively pressed" we were talking about the other day.

Mr. Boyken: That is in the claim of the patent.

The Court: That throws further light on the definition of the words, I suppose. It does not, as I recall it—now, I may be entirely mistaken—specifically mention that particular feature.

The Witness: In which patent, your Honor?

The Court: In the Simmons patent.

Mr. Boyken: I think it is quite obvious what the intention of the patentee was, and that was to set the——

The Court: I am speaking now of specific language, Mr. Boyken. If he has in mind any particular portion of the patent I would like to see it.

Mr. L. S. Lyon: I think if your Honor will look at page 3, line 67, it says: "This squeezing or forcing of the packer 15 into the "rat-hole" also anchors the body against rotary or turning movement."

The Court: Yes.

Mr. Boyken: There is no denial of that, your Honor, that that is so.

The Court: Is there any language of similar import in the——

The Witness: No. It states this, on page 2, beginning with line 5: "In Fig. 1 the parts are in such a position that

the opening in the disk D is closed by the half cover on the part C, and hence there is no opening through the device." [fol. 357] A half turn of the tubing from the top of the well will bring the parts into the position shown in Fig. 2, where the two half openings are upon each other, just leaving a free escape for the oil, so they turn relative to each other.

By Mr. Boyken:

Q. Now, let us go on, Mr. Abbett. Did you make a full size device in accordance with this disclosure of the Franklin patent?

A. I caused one to be made.

Q. Before we go on to that, will you describe the use to which the Franklin device is put, as that use is set forth in the Franklin patent?

A. The use of the Franklin device is generally indicated from its title, as a device for controlling and regulating the flow of oil wells. In explaining what that use was and what the conditions were under which that operated. Mr. Franklin explains in the first part of his patent that it was old to lower a pipe or tubing into a well with the lower end closed, that they used a brittle disc which they placed in that lower end, and that when they got to the place of operation, whatever that was, that the brittle disc was broken out. He also said that it was old at that time to provide a regulating valve that could be maintained closed after the pipe was down, so that the fluid pressure that might be within the formation could build up to a degree at which it would elevate itself, or the fluid from the pipe, when the valve would be opened again, and that he considered that he was the first man to provide a device that could be controlled from the top of the well, and which would be closed when he went down into the well, which he could open from the top of the well when he was down there, which he could close again at will, and that [fol. 358] he preferred, in using his invention, to go into the well with that valve closed, to open the valve, close the valve, and that when he came out of the well he preferred to have the valve closed when he came out. He then described the construction and the procedure by which that was done.

The Court: I was going to ask, was the Franklin patent considered as an interference in the contest over the Simmons patent?

Mr. Boyken: Yes.

By Mr. Boyken:

Q. You say a full size device was made in accordance with the Franklin patent?

A. Yes.

Q. And was that full-sized device ever actually operated?

A. Yes. It was operated three times, one of which I saw.

Q. How was that full-size device made? Was it in accordance with the drawings of the Franklin patent, or did it depart from those?

A. The procedure that was followed I think would be the fair way to answer that, that we took a photostat of the drawing of the Franklin patent and had that drawing scaled as accurately as we could as to the essential working parts, and made a device in accordance with present machine shop practice to be run as a testing tool in a well.

The Court: Made of steel?

A. Yes, it was made of steel, made in the same kind of construction as any other tester would be or any other metal members and parts; and the proportions of the parts we attempted to take off faithfully from the drawing in the patent. We understand, of course, that the drawing in the [fol. 359] patent is only an illustration and is not made to dimensions, but we have attempted to follow those dimensions as indicated in the patent exactly as far as the essential parts go.

Q. Where the Franklin patent mentions a packer, what did you use for a packer?

A. We used a packer which was a straight wall type packer, just a rubber part. In some tests we used a "rat-hole" packer, but the one test that I saw was what we call a straight hole packer, which is a cylinder of rubber mounted on the portion of the drill string extending down into the hole, the lower end of that pipe, or anchor pipe, on which it is mounted abutting against the bottom of the hole, so that the weight of the drill string above the testing structure would compress that cylinder of rubber out against the side wall of the hole.

Q. Is that full-sized Franklin device here in the courtroom?

A. It is.

Q. Is that the device that is over here on the opposite side?

A. Yes.

Q. Would you mind stepping over here, Mr. Abbett, and identifying it?

A. A device like the Simmons device——

Q. Exhibit 9?

A. Exhibit 9—has been made, as far as essential elements are concerned, as near to the patent application drawing as we know how to make it, and a separation of the parts will indicate the accuracy with which we attempted to follow this.

Mr. L. S. Lyon: I would like the record to show, your Honor, that the only device the witness referred to in his last answer is the valve structure, that there is no packer [fol. 360] here or any of the rest of the assembly that the witness has referred to using, only the valve itself.

Mr. Boyken: I was just going to ask him about that.

Q. Where was the packer located with respect to the Franklin device?

Mr. L. S. Lyon: I object to that, the use of the term "Franklin" in connection with this. If he is referring to the test that the witness made, that is a different thing, but that question can be read with reference to the Franklin device.

The Court: Make it what he says is the Franklin device. That will be sufficiently identified.

A. We followed the patent to that extent, in that we located the packer below the valve on the structure here, and attached it to the threaded connection at the bottom of the conical portion, which we have already referred to in the Franklin patent, I believe, as the part B. The packer, with the anchor pipe, was screwed into here, and run on down into the hole to be tested this valve structure being mounted on the pipe which carried the packer. The valve housing or outer cylindrical member, designated in the drawing as B′, is here shown as threaded onto that cylindrical portion of the member B, and within that are the valve elements which we will disclose. At the upper end of the structure is the pipe A′, which the patent says was connected to the tubing of the well. And this member here was a coupling into which we screwed the pipe which extended on up into the well, and by which the valve structure was rotated.

[fol. 361] Q. Can you open the device and show the court how the inside appears?

A. Yes. The member B has now been unscrewed from the member B'; and discloses the lower valve disc shown in—that will come out—shown in Figure 5 of the patent. That valve disc is formed with the opening through it and has those two pins so that the member may move up and down this way, in one form that Franklin describes. As I stated, he provides a little movement, because he knew about the sticking of valves, and he wanted to prevent any sticking of those rotary valves.

Mr. Richmond: I object to that. That isn't stated in the patent. Can he point out in the patent where Franklin says that? I ask that be stricken out.

Mr. Boyken: Just a moment.

Q. Mr. Abbett, will you show in the patent drawing where that stickiness of the valve is indicated, and also point it out in the patent?

Mr. L. S. Lyon: That isn't the objection, your Honor.

The Court: The objection would be good unless it is referred to in the patent. He may, however, refer to the patent.

By Mr. Boyken:

Q. Proceed, Mr. Abbett, and tell us what the patent says.

A. "Between the shoulder"——

Q. Where are you reading now?

A. I am reading from page 2, beginning with line 13, the paragraph there: "Between the shoulder b^2 and the flange b' there is enough room to leave a very little play vertically to the parts lying between. When the tubing is in the well the upper section is often held in suspension slightly, just [fol. 362] to keep it taut. This relieves the disc D of the weight of the tubing, and when the device is closed the pressure of gas keeps it seated on the part."

Q. All right. Now proceed with your description of the operation of what you say is a correct illustration of the device of the Franklin patent.

A. As the patent shows, this member here is the member A', and it extends downwardly and is enlarged at the bottom end and carries a flange, as shown here. On this member is a key. By placing it back in here—or, before doing that, I will call your Honor's attention to the fact that in

this enlarged portion here is the partition wall c, which extends across here, and that opening in it is arcuate and would agree with the opening in the member D, which is the movable valve element. Now, reversing the member B′ and bringing this up to where it belongs, you will see that this member here travels in that slot and can, upon rotation, move the half turn necessary to bring the openings of the discs B and the partition member c into or out of register. When those openings are in register, as you can imagine from the way I place that down, there will be a complete passageway through that tube. When we rotate this around in any other position there, as limited by the key and that slot, they go over to a place where they would be out of register and the tool would be sealed off.

Q. Was this alleged Franklin device actually used in California, to your knowledge?

A. Yes, sir.

The Court: He is going to describe now its use, for purposes of this action?

Mr. Boyken: Yes, your Honor.

The Court: Go ahead.

[fol. 363] By Mr. Boyken:

Q. Will you please describe the test which you witnessed? First, state when it occurred and where.

A. I am frank to state that I can't give you those dates. They are in an affidavit filed here in connection with the motion for injunction.

Q. About how long ago? The exact date will not be necessary.

A. Approximately a month ago.

Q. Where was the test made?

A. The test was made in one of the Standard Oil wells northwest of Bakersfield.

Q. What device was used?

A. The device used was the entire Simmons tool as here shown.

Q. Do you mean Simmons?

A. I mean the Franklin tool, as here shown.

Mr. L. S. Lyon: Maybe he meant Simmons.

Mr. Morgan: They are the same thing.

Mr. Boyken: They are so much alike that we could forgive him for that.

A. The Simmons tool here shown, together——

Mr. Boyken: The Franklin tool.

A. —together with a packer of this particular type.

By Mr. Boyken:

Q. Please state what type that is, for the purpose of the record.

A. That is a side wall packer.

Mr. Richmond: Anchor packer.

A. Or an anchor packer, which means that there was an anchor pipe or a length of pipe that extended from this end down to the bottom of the hole, and had perforations in it like this, so that the fluid could come in through it, this [fol. 364] being an anchor pipe also. And when the weight of the drill string here and the packer with the tester on it was imposed on this, it compressed and allowed this to go out in the well bore and make a seal, and that simple type of packer was the one that was mounted on the tool and put into the well first, with a length of extra string down there, and when we made that test, we, after having assembled the device, hadn't remembered which way the valve should rotate to open and close. The parts had all been placed in there. So, on the drill floor, on the derrick floor, we poured some water in here and turned it from one way to the other, to see which way was the right way to bring the holes in alignment or misalignment, and, after finding it, the packer was mounted on and run into the hole.

The Court: This identical machine?

A. This identical structure was run into the hole above a packer of that identical type. And when it was placed at the bottom of the hole, or as it went down, we attached above it an element for the purpose of ascertaining exactly what happened in the hole, this being a test to determine whether or not this valve in the Franklin device would open and close as Franklin said in the specification, and

whether it would retain the fluid which went through it and was up in the pipe.

Mr. L. S. Lyon: He doesn't say anything about that.
Mr. Morgan: We know that.

A. I said that was what we were trying to determine.

Mr. L. S. Lyon: I thought you said that was what he said.

[fol. 365] By Mr. Boyken:

Q. Let me ask you, Mr. Abbett, if you positioned the alleged Franklin device above the packer in your test?
A. We did.
Q. Proceed with the explanation of the test.
A. Above the packer and above the test tool, or, to be absolutely accurate, above the structure which we built in accordance with the Franklin device, whether it is a test tool or valve, we placed a structure that had been built which contained not a brittle disc but an aluminum disc capable of being perforated. This fits on a seat down there, with that bowl part down to resist fluid pressure. And then we have a pointed member here with holes in it that lead up and come out here, and that member is in that fashion and will be perforated. This center spike, this hollow spike, will be driven through it so that temporarily, or until you determine where you want it, all of the fluid from the drill string is excluded.
Q. What was the object of using that disc in the device that you have last described?
A. The object was so that after we got that structure here of the Franklin patent down in the hole we would know absolutely whether or not there was any fluid in the drill string above it and be certain that when we started our test that whatever happened during that test happened when we had the device in the bottom of the well.
Q. Did the metal disc have anything whatever to do with the operation of the alleged Franklin device?
A. No. It just excluded the fluid from the well.

Mr. L. S. Lyon: The fluid from what?

A. From the drill string.

[fol 366] By Mr. Boyken:

Q. Proceed with your explanation of what happened.
A. When we got down there, to be sure that there were

no leaks in the pipe going down, at the upper end of the drill string, which was up here——

Q. At the top of the well hole, do you mean?

A. Yes. —we put an oil rag, and that makes a temporary seal, which is used, I think, by all of them in testing. And, if there is any leak in there which would cause the air to be displaced, this would bulge up in the air in that way and the air would blow out from underneath it and you would know whether there were any leaks going down. After we had made that test and had seen that this rag is just like it is there, then we dropped a go-devil in here and broke out that disc. But before having done that we took pains to see if the stop was against the shoulder here, which meant that the valve in here was closed. After we broke this disc out then we made this test again to see if this valve in here was closed; and, since there was no disturbance at the top of the hole, we knew that there was nothing coming up through that valve into the drill pipe. Then we turned the structure in the direction which would bring those ports into alignment, and when it had been turned the rag on top of here blew up that way to show that there was some displacement of the air in here by the material coming through the valve. That only lasted a short time when we noticed that the fluid, which, by the way, filled the entire well bore in which all of these members had been inserted and was level with the top, and which they maintained at that level during the test so that there was a constant column of fluid clear to the packer, in the ditch and in the top of the hole [fol. 367] began to drop rapidly. What happened was that the fluid was at that time passing the packer and going down into the hole while we had the valve open, and thus there was not a perfect seat for the packer where it was coming around and was coming up in the drill stem. The pit in which the mud or drilling fluid is accumulated as it circulates into the well and out and back again was checked to show how much it had fallen, and the amount of that drilling fluid was computed so that we would know how much was required to replenish the supply in the well and so that we should be able to account for that lost fluid in the drill string.

Q. Mr. Abbett, let's not go into all of this detail. Let me ask you some questions about this. How far was the so-called Franklin device inserted in the well? How deep was it in?

A. It was down in the neighborhood of 2300 feet.

Q. And what was this fluid in the well that you have referred to?

A. It was drilling fluid which was rather heavy but not viscous mud circulated in the well.

Q. And did you open and close the valve of the so-called Franklin device during that test?

A. Yes. At that time I just mentioned we closed the valve.

Q. Did you open it first and then close it?

A. We had opened it, yes, before the fluid dropped.

Q. And then you closed it?

A. Yes.

Q. And how did you open and close the valve of the Franklin device? Just state that briefly.

A. By rotating the pipe at the upper end of the hole.

[fol. 268] Q. And then when you had made your test did you then close it?

A. Yes.

Q. And then after the valve was closed what did you do with the Franklin device?

A. The entire structure and all of the drill string was taken out of the well. It took in the neighborhood of an hour. And eventually we came to a place in the well where when we took off——

Q. Don't go into all of that detail. What did you get out of that?

A. We got about 260 feet of fluid within the drill string.

Q. How did that fluid come to be within the drill string?

A. By the opening and closing of the Franklin valve.

Q. And what was that fluid?

A. That was drilling fluid that had leaked around the packer and come up into the pipe.

Q. Did you consider as far as the opening and closing of the valve was concerned that it was successful or not?

A. Yes; I did because the valve closed, and when we came out we got that amount of fluid, and when we came to the last length of pipe, which stood about 90 feet in the derrick, we had the man on the top of the derrick tell us the condition of the pipe, and the pipe was full exactly to the top, and it stood there and we unfastened the tool here and allowed that last 90 feet to fall out.

Q. What was that difficulty that you encountered in making this test?

[fol. 369] By the Court:

Q. Do you mean the leaking?

A. Yes. The leaking around the packer while it was seated was the difficulty. It had nothing to do with the operation of the valve.

By Mr. Boyken:

Q. That is just what I was going to ask you. Did that in any way change or affect the operation of the valve?

A. No. The difference would only be that the fluid we got, since the drilling fluid was not packed off, was drilling fluid.

Mr. Boyken: That is all I have, your Honor, except I want to offer the full-sized Franklin device in evidence and I ask that it be marked the defendants' exhibit next in order.

The Court: It may be introduced in evidence.

The Clerk: Defendants' Exhibit K.

By Mr. Boyken:

Q. Just one more question with respect to this test. Was the packer that you used in connection with the Franklin device a packer that was known in the year 1882, at the time of the Franklin patent?

A. Yes. It was substantially the same type of packer as those which had been shown in patents and also the literature.

Q. By that you mean the literature that was referred to this morning?

A. Yes; the technical literature.

Q. And earlier than the date of the Simmons patent application?

A. Yes.

Q. I am going to read to you claim 9 of the Simmons patent, and I want you to look at the drawing of the Frank-[fol. 370] lin patent and point out wherein you find in that drawing the elements of the claim as I read it. "Apparatus for testing a well comprising a string of pipe to be lowered into a well having an inlet at its lower end."

A. The patent describes a string of pipe as being attached to the members A', of which A' is a continuation.

The inlet is through the member A′ and the semi-circular opening in the partition member c.

Q. Again referring to the Franklin patent, I am going to read from claim 9 of the Simmons patent. "and carrying a packer adapted to be positively pressed against the walls of the formation." Do you find any showing of a packer in the Franklin patent?

A. The disclosure of the Franklin patent is that the valve structure is disposed at a point above the packer.

Q. "and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated." Do you find that in the Franklin patent?

A. Yes. That is the two disc-shaped members c and D.

Q. Please take up the McGregor patent, Mr. Abbett, No. 582;828, and briefly explain the drawing of that patent with reference to this suit.

A. The McGregor patent merely shows a single string of pipe run into a hole, and it has a breakable disc, indicated at a, on the bottom end of it. That is described as being made out of glass. And there is a valve ball that seats above there. It is for use in obtaining samples of subaqueous bottoms or soundings, as in the drilling indicated by C here, if they lost a diamond off of a bit. They break that member up and head down here causes that fluid to come down in by that ball.

[fol. 371] Q. How high does that fluid extend in the well?

A. In this well it shows it extending almost to the top. In normal drilling operations, however, it does extend to the top.

Q. Let's pass over to the next patent, the patent to Bloom, No. 785,933.

A. The Bloom patent has been merely selected to show the practice in 1905 of having the large bore at the upper end of the hole, a reduced bore beneath it, with a tapered face on it, and a tubular member, which is here described as a casing B, having a tapered packer fitting into that hole.

Q. Will you take up the next patent, which is the Cooper patent, No. 1,000,583?

A. The Cooper patent is entitled "A packer for operating gas, water and oil wells." It consists of a single string of pipe, here designated as 2, which runs down in the well through the various fluids that may be in it, and at its lower end it has a valve 25. This valve is fitted

with a sleeve so that an opening 24 in that sleeve may register with an opening in the pipe 2 or move out of register with it, to permit fluid to go in that opening or to be excluded therefrom. The valve is operated in this case by a string or cable which extends upwardly to the top of the well and may be opened and closed at will. The structure also includes a packer, which in this case was a packer adapted to be filled with liquid and expanded to seal off an area below it, into which the fluids in the lower area might be confined so that when the valve 25 is opened they would go into the string 2, and when the valve 25 was closed such material as was in there would be entrapped. The packer 25 is fitted with a pipe by which it is [fol. 372] filled with the liquid or from which the liquid in the packer may be drained.

Q. Is that a device to be used in connection with oil wells?

A. Yes; that is to be used in connection with oil wells. And for determining and testing the well, as he has stated over here, by this method of procedure a well can be tested for the presence of oil or gas by pumping, which could not be done if a flood of surface water were entering the well which the pump or bailer was incapable of removing. So it excludes the water which might be above the packer and allows the fluids which might be below the packer to be sampled or tested.

Q. Would you call that a formation packer that is shown in the drawing of that patent?

A. Yes. The packer presses exactly against the formation. In fact, the drawing, Fig. 1, shows a casing which extends partly down the well and then the packer is lowered on through the casing and is set against the formation.

Q. Was this Cooper patent cited by the Patent Office during the prosecution of the Simmons patent application?

A. It was and was the basis for the rejection of quite a few of the claims, which were cancelled in a number of instances without appeal.

Q. Will you please pass on now to the next patent, which is to Cox, No. 1,347,534?

A. The Cox patent was filed in 1920, and it was a device for testing wells for oil or gas. It issued in 1920. It has a packer at its lower end which is made of rubber and can rest on the shoulder which occurs at the point where the bore of the well is reduced. Above that packer is a con- [fol. 373] nection by which it is fastened to a drill tube

or drill pipe extending to the top of the well, and in that pipe is a test tube which is described as being a metal hose, which extends down and communicates with the passageway through the packer. There is a mandrel on which the packer is fitted and through which the passageway extends, and it carries a perforated pointed tube which, when the packer is compressed and bows out against the wall of the well, will move down and strike a disc set across the mouth of the opening in the bottom of the packer, breaking it and allowing the fluid from the reduced bore to flow upwardly through the perforations and into the central tube of the structure, after which a small flapper valve, which would act like a leaf of paper coming down in the opening and indicated at 15 in Figure 2 of the drawing, would close so that as the device is lifted from the well the column of fluid resting upon that flapper valve would include an entrapped sample.

Q. Is there anything said in the patent with respect to wells drilled by the rotary method?

A. Yes.

Q. Where do you find that?

A. In the second paragraph it says "This invention relates to improvements in well-drilling, particularly to wells drilled by the rotary system."

Q. What fluid, therefore, is this device lowered down through?

A. It is lowered down through drilling fluid which is a fluid made up of water and mud at the well or through materials which would add weight to that fluid without increasing materially the viscosity of the fluid.

[fol. 374] Q. Is it a device for testing wells for oil?

A. It is.

Q. I am going to read to you claim 9 of the Simmons patent in suit and ask you if you find the elements as I read them in the drawing of the Cox patent. "Apparatus for testing a well." Is this apparatus for testing a well?

A. Yes.

Q. "comprising a string of pipe to be lowered into a well." How many strings of pipe are there?

A. There are two pipe elements. There is an outer drill string and a metallic hose that goes through it.

Q. Will you choose one of them as being a string of pipe to be lowered into a well?

A. In view of the fact we are concerned with entrapping a sample in a string of pipe, I will select the center metallic hose as being the pipe.

Q. Continuing, "having an inlet at its lower end." Is there an inlet at its lower end?

A. Yes; there is an inlet at the lower end of the pipe communicating with the passageway through the body of the packer-supporting element.

Q. Then it says, "and carrying a packer adapted to be positively pressed against the walls of the formation." Is there such a packer there?

Mr. L. S. Lyon: Do you mean is it carried by that string?

Mr. Boyken: Just let me finish and I will bring that out.

Q. Do you find a packer there?

A. I find a packer there adapted to be pressed against the wall of the formation.

[fol. 375] Q. You chose the inner pipe. Do you find the packer being carried by that inner tube?

A. It is carried by a body member 6 to which the inner tube is connected.

Q. Is that packer "adapted to be positively pressed against the walls of the formation to seal off the same from the inlet"?

A. Yes. That is the construction of the packer and the way it is described.

Q. Now, continuing, "and a valve for the inlet positively controlled by movement of the pipe."

A. The valve for the inlet includes the movable member 7 which is perforated, which goes down and breaks the disc at the bottom of the packer, which opens or establishes communication in one direction, and a flapper valve 15 which interrupts the flow in the opposite direction, one operated by downward movement of the pipe and the other by upward movement of the pipe.

Q. That substantially disposes of the end of this claim but I will read the language. "and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated."

A. Yes; that is correct.

Q. Do you find that in the disclosure of the Cox patent?

A. Yes.

Q. That so-called valve that is shown at the bottom of the Cox patent is virtually in two parts, is it not?

A. Yes; the moving element, which is common to both parts, is the mandrel 9 carrying the perforated end piece 7 and the disc at the bottom of the packer and the valve 15 within that.

[fol. 376] Q. In order to open that valve that brittle disc, or I believe it is a glass disc as it is described in the patent, is broken, is it not?

A. It is.

Q. And then the fluid from the formation to be tested goes upwardly through that interior tube?

A. Yes. The pointed member 7 will then penetrate down through the bottom of the packer and will be exposed to the pressure of such fluid as is in the "rat-hole" so that that fluid may go upwardly through the member 7 and into the metallic hose 13.

Q. And is that fluid that passes upwardly from a restricted zone?

A. Yes. It is from the zone that is below the shoulder on which the lower end of the packer rests.

Q. The packer forms that restricted zone, does it?

A. Yes.

Q. And does the whole device go in the well hole and down through the mud?

A. It does.

Q. And what is it that causes the fluid from the formation to pass upwardly through that inner tube?

A. The pressure that is present in the fluid which occurs within that area of the formation.

Q. Is that fluid then entrapped in this device?

A. It is when the valve 15 closes.

Q. That is a different valve from the valve that we said opened, is it not?

A. Yes.

Q. And when that entrapped fluid is in the device what is done with the device?

A. The device is withdrawn from the well with entrapped fluid within the metallic hose 13.

[fol. 377] Q. You have two valves there. Is that in any respect similar to the two valves of the Johnston device, the defendant's device here in suit?

A. Yes; in this particular, that the lower valve 15-A, which is the valve you can break out, must be broken out before any sample can be taken, and that corresponds to

the trip valve mechanism of the Johnston patent, which must be actuated before the sample or fluid will be permitted to flow into the structure. The valve 15 is as to function the main valve of the Johnston device or it is that valve which produces the entrapment of the sample.

Q. Is there any provision in this patent for reestablishing circulation?

A. Yes.

Q. What do we mean by reestablishing circulation?

A. In drilling a well, as previously stated, there is a passageway directly down through the drill string and out through the holes in the bottom of the bit through which mud is constantly forced, and this mud flows through the bit, comes up the outside wall, or between the wall of the bore and the bit and drill string, and tends to maintain a pressure, due to the weight of the column, which prevents cave-ins, which muds up the wall and carries out the cuttings and one thing and another and prevents the tools that might be in there from sticking. A circulation means maintaining a flow of that fluid down the well and up and back and around and down and when that is maintained the circulation is established. In this particular structure circulation may be maintained or established through the drill string 1 so that the fluid comes downwardly into the drill string and out through the holes 4 into the well bore and then returning up [fol. 378] into the bore. If it so happens that after this tool is partly withdrawn from the well and is off its seat and it becomes necessary to establish circulation, in that event, in order to hold down the pressure of the fluid in the well, the fluid will flow down around the packer and completely fill the hole, thus reestablishing the pressure of the entire head of fluid or column of fluid in the hole.

By the Court:

Q. You say it will go around the packer. How does it get around the packer?

A. I stated, your Honor, that, if the packer had been partially raised from the well and it was necessary to reestablish it, it would be in that position there, which would not be in its collapsed position. It would be partly up the well and contracted so that there would be a space down around the packer so that it would go right on down.

By Mr. Boyken:

Q. That is to say, if you take the packer away from the walls of the formation, there will be an annular space between the outside of the packer and the interior walls of the formation?

A. Yes; when the packer then is relieved of the pressure of the weight and of the drill string above it and can again contract circumferentially to clear the hole.

Q. Now, there are two patents to Halliday, Nos. 1,474,630 and 1,510,669, both being to the same man. I think we will skip over the first one in order to save time. Will you take up the second Halliday patent, which is very similar to the first one, and describe that structure? ~~I am now~~ referring to patent No. 1,510,669.

A. The Halliday patent is more, as it states here, "a perforation cleaner for oil wells." As shown in Figure 1 of this patent, 1 is the casing which lines the well at the time [fol. 379] they are producing. When they are "producing" means that this casing here has holes in it, as indicated at 2, through which the oil may flow into the well and they can pump it. At times during the operation of production the silt and sand and other solids in the oil will accumulate in those perforations, so that they have to be cleaned out, and the way they usually clean it is by forcing water back and forth through those perforations 2. The Halliday device, therefore, is a device here described as being inserted into a casing 1 to clean the perforations 2. In doing this he provides a string of pipe which runs to the top of the well and at the lower end of it he shows two packers. Those packers are mounted on a sleeve 34, and within that sleeve is another tube. The inner tube and the outer tube have holes through them, indicated in Figure 1 at 42, which is the hole below the lower packer 6, and 41, which are holes between the lower packer 6 and the upper packer 5, and 40, which are holes above the upper packer 5. Mr. Halliday, by a complicated——

Q. Don't go into that, Mr. Abbett.

A. I was going to say by this complicated arrangement he may bring either one of those sets of holes into relationship so that he can get a flow of fluid through them, and by one adjustment of the device he gets a flow of fluid through the set of holes 42 from inside the tube 31 and out through those holes below the packer through which the fluid may flow in or out into the sealed off area below the packer 6.

[fol. 380] Q. Is there anything said in this patent with respect to it being utilized as tubing or for a string in a flowing well?

A. He states, on page 5 at line 99, "The device may also be used as a packer at any desired depth in the well, the desired fluid being admitted to the tubing string through either the upper or lower ports as circumstances may demand."

Q. I also call your attention to page 1, the second column, commencing about line 89.

A. Yes. He states at that place, "My well cleaner may be allowed to remain connected with the lower end of the tubing string in a flowing well."

Q. Are you familiar with the file history of the Simmons patent here in suit?

A. Yes.

Q. Let me ask you with respect to these Halliday patents, they show packers, do they?

A. They do.

Q. And casings?

A. Yes.

Q. And oil well flowing apparatus?

A. Yes.

Q. The next patent is the one that was in litigation in Texas here some years ago. That is the Edwards patent. And I am going to ask you to take up the Edwards patent, which is entitled, "Testing Device for Oil Wells." The number is 1,514,585. I will ask you now to leave out all of the details and explain the structure and mode of operation [fol. 381] of this patent with particular reference to its similarity with the Simmons patent here in suit.

A. Do you want it from the enlargement or from the patent?

Q. Either one that the court desires.

The Court: Bring the large sheet up here.

A. The Edwards device is a testing device for oil wells, which was filed in 1921, and it includes a string of pipe 1, which may be drill pipe, coming down from the top of the well. And the pipe is fitted at its lower end with the member 4 to which a packer 5 is connected. This packer seats directly against the wall of the formation, as shown in Figure 2 of the drawing. There is a tapered opening through the packer 5, or I mean through the member 4, and in that

opening is a removable sleeve 7. It is just a tubular member which is tapered to correspond in taper to the opening through which it passes and within which it seats. That sleeve has packing at 9 which makes a tight fit around a tube 8. The tube 8 is the member through which the sample is obtained. In its normal position, before a sample is taken, the tube 8 is drawn up into the sleeve 7; and, since it is fitted with perforations which appear on the wall of the lower portion of the sleeve, communication between the interior of the tube 8 and the well at any point is prevented. At the lower end of the tube 8 is an enlarged head having a conical point and a tapered portion which threads, or is threaded, into the tube so that temporarily this tapered head is screwed into the lower end of the part marked 7 and holds that portion of the tube 8 so that there is no displacement between the two members at that time. When a sample is to be taken it may be taken by rotating the member 8 with relation to the sleeve 7, which sleeve is at that time frictionally [fol. 382] held in the seated member 4 so that it won't turn, and that will unscrew the head or lower pointed portion of the member 8 so that it is released, and the pipe 8 may be moved downwardly into the fluid passageway through this packer which goes all the way down and communicates with the bottom of the structure by which it is set in the hole. And then the fluid may come upwardly through those perforations in the pipe 8, up to such a level as the pressure beneath the packer would produce. The string or pipe 8 when elevated would withdraw the perforated portion of that pipe from beneath the sleeve 7, causing the perforations to be covered by the sleeve and closed or sealed by it. Then the further lifting of the member 8, which is the pipe within which the sample is placed, would cause the sleeve 7, which is now in the position shown in Figure 1, to be unseated from its tapered seat, thus allowing the pipe 8 with the sleeve covering the perforations at the bottom to be bodily taken out of the well and, if necessary, placed in again but drawing with it such fluid as was entrapped within the member 8 due to the closure of its lower end by the sleeve 7.

Q. Mr. Abbett, let me ask you is this a testing device particularly adapted for oil wells?

A. Yes.

Q. Does it embody a packer in order to effect a seal?

A. It does.

[fol. 383] Q. Does it have a passageway through the packer from the formation which is to be tested to the top of the well?

A. There is a passageway established, yes, when the member 8 is lowered so that the perforations are below the end of the sleeve.

Q. And is there a valve mechanism shown there?

A. Yes.

Q. And a drill pipe?

A. Yes; the drill pipe 1.

Q. I think we will pass on to the next patent and that is the last one, unless there is some other particular point that you desire to call attention to in the Edwards patent.

A. No.

Q. Let's pass on to the last patent, which is the Macready patent No. 1,522,197. Why did you select that patent?

A. For the sole purpose that it shows a "rat-hole" packer on a device for making production tests in well drilling, the application having been filed in 1922 and issuing in a patent on January 6, 1925. In this patent it will be noted that the member S is a tapered packer which, as shown in Figure 2, seats at the juncture of the reduced bore or "rat-hole" with the larger bore of the well and effects a seal so that fluid may pass upwardly through it from the "rat-hole."

Q. Will you take up the Simmons patent in suit? You have studied that patent, have you?

A. Yes.

[fol. 384] Q. And you have examined Exhibit No. 9, which is the device that was made in accordance with the drawings and disclosure of that patent?

A. I have.

Q. As a mechanical expert, Mr. Abbett, familiar with oil well practice, do you consider that the structure which is disclosed in the Simmons patent is a practical and operative device?

Mr. L. S. Lyon: I object to that, your Honor, on the ground that the witness is not competent to give any testimony that will help the court on that matter. He is not an operating man and not an operator in the oil fields. He is a patent solicitor. The testimony of this witness and his opinion that this is not a good device certainly cannot overcome the positive testimony that it was successfully used.

The Court: Of course, an expert may give such testimony.

Mr. L. S. Lyon: Yes. But this man is not an oil man. He is not a practical man in the field.

The Court: I say an expert, one who is called as an expert of a certain kind, may give such testimony. May he not?

Mr. L. S. Lyon: If it is material. But this witness has not qualified to give that kind of testimony. He is not an engineer and he is not a mechanic and he doesn't work in the fields and has not worked on an oil well.

Mr. Boyken: I understood Mr. Lyon admitted his qualifications this morning. And I further qualified him with respect to oil well practice.

Mr. L. S. Lyon: I didn't admit any qualifications about him. I reserved the qualification as to his having any practical knowledge of these things. I said he was a patent so- [fol. 385] licitor and used to reading patents. It would be like asking the court reporter for his opinion of the operativeness or effectiveness of this tool.

The Court: What did the witness say his occupation was?

Mr. L. S. Lyon: A patent solicitor.

Mr. Boyken: Specializing in oil well apparatus.

Mr. L. S. Lyon: He writes out applications for patents. He never worked with these tools at all. He never ran them himself.

Mr. Boyken. I am asking his opinion, your Honor, as a mechanical expert and it goes to the very heart of our case. Our contention is that the patent does not disclose an operative, practical device.

Mr. L. S. Lyon: He is not a practical expert and he is not a mechanical expert.

Mr. Boyken: If there is any question in your Honor's mind, I want to qualify him further.

The Court: Well, you had better qualify him further.

By Mr. Boyken:

Q. Mr. Abbett, please state your familiarity with mechanical matters. First state your education and training, and then your practical experience.

Mr. Boyken: I thought this was all admitted this morning, your Honor.

A. I graduated from Manual Training High School in Indianapolis in 1907. That high school gives the usual scholastic courses, and, in addition, we were required to take

shop work, including three years of mechanical drafting and designing, a year of free-hand drafting, and wood work, pat- [fol. 386] tern making, forging, foundry work, machine shop practice in the machine shop. After that I went for a time to Butler College, taking the usual scholastic work, and then went to work with the E. C. Atkins Company in Indianapolis, who are saw manufacturers, and who require the manufacture of various special machinery in the manufacture of saws and like steel products. I then did work in mechanical and electrical designing with the Waverly Electric Company, who were manufacturers of the Waverly electric automobile some years ago, and later came to California and did similar work with the Baker Iron Works, and engaged in general mechanical design of various types. The period of my work in mechanical designing covers approximately nine years. Then I did patent drafting, which was the making of patent drawings, and came into the office of the patent attorneys in which I have been for the last 20 years, studying and being familiar with the mechanical structures with which we were concerned in preparing and prosecuting patents.

Q. Please tell us your familiarity with oil well apparatus, particularly with the practical side of it as you have noted it out in the oil fields.

A. I have never worked in the oil fields. The only practical experience I have had in connection with oil work is in being required, over this period of twenty years, to visit oil fields and visit machine shops where oil field tools were being manufactured, in observing them and receiving the explanations of their engineers and inventors, and in attempting to reduce their inventive ideas to the form of patent applications, and the prosecution of such applications.

[fol. 387] Q. I am going to ask you the question again.

Mr. L. S. Lyon: I would like to ask the witness a question before your Honor rules, or a couple of questions.

The Court: Yes.

By Mr. L. S. Lyon:

Q. You have had no connection with the oil drilling industry except as a patent attorney; is that correct?

A. That is correct.

Q. You don't claim to be a mechanical engineer?

A. No, I don't. My familiarity with the oil industry, as I have frankly stated, has been in contact with their engineers and inventors over a period of 20 years, and familiarity with and the studying of problems in connection with patent applications.

Mr. L. S. Lyon: I renew my objection, your Honor. The witness has had no actual experience in the oil industry, and does not claim to be a mechanical engineer. Now, the woods are full of patent solicitors, and I certainly don't think that they are authorities on what is a useful tool in the oil business and what is an operative tool in the oil business.

Mr. Boyken: I would like to ask Mr. Abbett a further question.

By Mr. Boyken:

Q. How did you gain your mechanical knowledge, inasmuch as you apparently have no college degree?

A. Well, that is a long story.

Q. Tell us over what period of time you have actually gotten your hands dirty in mechanical matters.

A. During the period I was in school and during the period I worked in connection with drafting and designing problems, which was approximately 9 years.

[fol. 388] Mr. Boyken: Now, I want his opinion, if your Honor please, unless I am overruled, as a mechanical expert in this case, by looking at the design of the structure, and asking him whether he considers it a mechanical device for satisfactory operation.

The Court: But the question was directed to the practical working of the Simmons patent.

Mr. Boyken: I will modify the question. I will not tie it up with the patent.

The Court: Ask your question so that it will be complete.

By Mr. Boyken:

Q. As a mechanical expert, Mr. Abbett, familiar with oil well practice, do you consider the structure disclosed in Plaintiffs' Exhibit No. 9 to be a practical operative device?

Mr. L. S. Lyon: I object to that for the reasons stated, your Honor. In the first place, the question is asking things from the witness that he doesn't even claim himself, and

that is, that he is a practical expert, or that he is familiar with the practical operation of oil well equipment. He is asked for his opinion as to whether this is a practical device or not, which he don't know anything about, or at least he certainly is not an authority on the subject such as the court is required to listen to his opinion.

The Court: I feel compelled to sustain the objection, with some reluctance. I don't believe it is shown that the witness has had the practical experience or specialization in this particular art to know whether that tool will operate or not. The testimony the witness has given is quite a refreshing [fol. 389] experience, but I don't believe—I think it would be error to allow the question, in view of the witness' own statement. Objection sustained.

Mr. Boyken: An exception."

Q. Will you take up the Simmons patent, the patent in suit? You are familiar with the interpretation of patent drawings and patent specifications, of course, Mr. Abbett?

A. Yes, I believe I am familiar with those.

Q. Now take claim 9 of the patent which has been referred to. That appears on page 4. It reads: "A packer adapted to be positively pressed against the walls of the formation." What does that mean? I am calling your attention particularly to the words "walls of the formation."

A. That means that the packer is going to come in physical contact with the walls of the formation.

Q. In physical contact, you say, with the walls of the formation?

A. Yes.

Q. As distinguished from other packers which come in contact with what?

A. With casings or any other interposed object.

Q. Do you find that limitation in all of the apparatus claims here in suit, substantially that language?

A. Substantially the same limitation, yes.

Q. It doesn't say anything in these claims about a packer that comes in physical contact with the interior of the casing, as distinguished from the formation?

A. No. It states the walls of the formation, and the walls of the formation is the native substance through which the well bore is being penetrated.

[fol. 390] Q. What does the word "positively," as used in that portion that I read, signify to you?

A. It signifies to me, in connection with the word "pressed," that he presses that packer against the wall in such a certain and definite manner that he creates a seal with the packer.

Q. In another portion of that same claim it says, "A valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet," etc. What does that word "positively" signify to you?

A. "Positively," in that sense, in my estimation, would be that the act of closing that valve was not one that was at random or accidental, but that it was a deliberate act to definitely close the valve.

Q. Now, in the case of the Johnston tester, that is, the defendant's tester, the Johnston tester, using the water shut-off tests, is that packer there positively pressed against the walls of the formation?

A. No.

Q. What is it pressed against?

A. It is pressed against the casing, like in the Halliburton patent.

Q. And this second portion that I have called to your attention, has the defendant's device a valve for the inlet positively controlled by the movement of the pipe?

A. No, I don't consider that the Johnston valve is a valve that is positively controlled by movement of the pipe.

Q. Now, please explain that.

A. For the reason that the Johnston valve has within it, in its structure, a yieldable element, which is a spring, [fol. 391] as distinguished from the Simmons device, in which there is no possibility for any yield, due to the fact that the valve members abut against each other at right angles to the direction of pressure on that structure, and the action in the Simmons device will, of course, be a positive pressure, where in the Johnston device there is an interposed spring, which makes it possible for the valve to operate at times without any reference to the movement of the pipe at all. Going into the well the valve can open at any time that the packer or its associated parts strike an obstruction, and when the packer is seated on the hole at any time that the seats fails, as we call it, falls away or erodes, the spring in the valve will immediately move that entire structure downwardly and close the valve. So that I do not consider, in the true sense of the word, that the

movement of this pipe produces a positive control of that valve.

Q. I understand that the plaintiff's theory of this case is that the lower valve in the Johnston device is the one they consider as corresponding to the valve set forth in the Simmons patent. Now, assume that that is the only valve that is to be considered in the Johnston device——

Mr. L. S. Lyon: You mean the main valve?

Mr. Boyken: What you call the main valve, and what we call the main valve also. There are four valves in there, but we will call it the main valve.

Mr. L. S. Lyon: You said the lower valve. There are a couple of other lower valves in there.

Mr. Boyken: What you call the main valve.

[fol. 392] Q. Now, that main valve in the Johnston device there, is that the one that you say is not positively controlled, in your opinion, by the movement of the pipe?

A. Yes.

Q. In the Johnston device may that main valve, so-called, be opened, latched open, let us say, while the device goes down through the rotary mud to the place where it is to test the formation?

A. The main valve is the valve in this Johnston exhibit indicated by yellow, and the white portions in that yellow area are the fluid passageways. We have just broken out a portion of the outer casing at each point, so that those parts could be identified, although they do extend on upwardly into the pipe. The main valve is the portion indicated by the yellow field.

Q. Now I am asking you if the Johnston tool would satisfactorily operate if that main valve was open during the time that the tool went down into the well and remained open until the sample was to be entrapped.

A. The main valve is capable of opening freely at any time during the time that the tool is being lowered to the fluid, to the point of test. Valve structures have been made this way before. It is possible, for example, to put a pin right across through there which would hold it open, and it will shear that pin off by the weight when you get down there. In other words, this main valve, as shown in the two center views, can remain in that position all the way down the well, but it is for the purpose of entrapping the sample after the sample has been let in. As in that Cox

patent, where the flapper valve entrapped the sample, this valve's only function is to close and entrap such fluid as is [fol. 393] above it when the structure is to be withdrawn from the well.

Q. What is the principal function of the so-called main valve in the Johnston device?

A. Well, it could be very properly defined as a sample-retaining or trapping valve, because that is the purpose for which it is placed there, and it has no free design or necessary valve action at any time until it does trap that sample.

Q. As I understand you, the Johnston device could be operated satisfactorily if it was lowered through the rotary mud with the main valve remaining open?

A. Yes, providing this valve (indicating) was closed.

Q. Providing the trip valve was closed?

A. Yes.

Q. I am speaking of the main valve now. It could be lowered through the rotary mud and the packer seated?

A. Yes. I hate to answer that with a definite yes, though, because when you say can this be lowered through the mud with the valve open you have a necessary adjunct to that valve, which is the trip valve, which must be closed in order to take a sample.

Q. Then let us get the relationship between the trip valve and the main valve. How do they cooperate, if at all?

A. Due to the fact that the Johnston tool has eliminated any operation which would entail the rotation of the tool to bring about any function, it has adopted a valve which operates directly on vertical force, by the weight and vertical manipulation of the drill pipe, and with such a valve it is evident that, under certain circumstances, it would [fol. 394] open going into the hole, and, if it did, it would not be what one would call a tester, which would be a device by which certain and definite evidence could be obtained. For that reason we must provide a positive means by which we collect and know that we have our evidence, and that is the trip valve, which is locked closed and can only be premeditatedly and wilfully opened, and that trip valve is necessary, due to the inherent fact that the main valve would tend to open as it ran in the hole moving vertically.

Q. Providing the trip valve in the Johnston device is closed, does it make any difference whether the main valve

is open or closed while the tool is being lowered into the well hole?

A. No. That valve is for the purpose of obtaining and entrapping a sample.

Q. Now then, suppose the tool is lowered into the well hole with the trip valve closed and the main valve open, as shown here in the second figure from the left, and the packer seated, and the perforated pipe extending in the formation to be tested. Now, with the main valve open under those circumstances, is there any fluid from the portion to be tested that flows upwardly through the main valve, and how far does it go?

A. Such fluid as is within the "rat-hole," which of necessity would be the formation fluid and the drilling fluid entrapped within the "rat-hole" when you seat, would move upwardly through that open valve until it reached here, and it could get no further.

Q. I want to get your interpretation of that portion of claim 9 which I read, "a valve for the inlet positively controlled by movement of the pipe to open and close the inlet."

[fol. 395] Mr. L. S. Lyon: I object to that, your Honor. If it is just a question of this witness' interpretation of a claim, that is a matter for the Court entirely. It is the Court's function to decide——

The Court: He can say in what manner the claim applies, I suppose, to the instrument, to the tool. I will hear his answer.

Mr. L. S. Lyon: An exception.

A. The main valve, as we call it, is at least closed after a movement of the pipe, but I don't consider that valve there as being the inlet valve, because the test chamber is from this valve on up.

Q. What do you consider to be the inlet valve?

A. I consider the trip valve to be the inlet valve, because until that valve is opened there is nothing let into the test chamber at all.

Q. And the function of the main valve, in your opinion, is what?

A. To entrap——

Mr. L. S. Lyon: He has answered that several times, your Honor.

The Court: Yes, I think he has.

Mr. Boyken: Well, I wanted to show the difference between the Johnston device and the claim, your Honor.

The Court: The trip valve is to allow the material to be tested to go into the chamber where it is saved?

A. That is right. And it is caught by that valve; it is allowed to go in by that valve, but caught by this one.

By Mr. Boyken:

Q. You mean the chamber is closed by the main valve?

A. Yes.

[fol. 396] Q. The testing fluid that is to be tested is caught or the chamber closed by the closing of the main valve?

A. It is entrapped by the main valve.

Mr. L. S. Lyon: Can I ask a question?

Mr. Boyken: Yes.

By Mr. L. S. Lyon:

Q. If you don't want that main valve closed what do you have that spring on it for?

A. That spring is on there——

Q. That keeps it closed, doesn't it, going down the well?

A. No, it doesn't keep it closed. It tends to keep it closed, but, due to the contingencies, as I have had them explained to me, the spring has its particular function when you get down the hole on the seat, and there is a tendency for that seat to get away from the structure here, and you don't want to take the sample while there is a tendency for mud fluid to come around here. And then, too, there is a tendency for that seat to break away when the valve closes. In other words, if you had the pressure of the hydrostatic head, which is sometimes 5,000 feet, coming up through here and through that valve, it would cut out that valve before you could do anything about it at all, and that spring automatically closes.

Q. Then you do want to keep that valve closed until you get the packer seated?

A. No.

Q. Didn't you just say so?

The Court: Well, don't cross-examine at this time. Go on. I want to ask a few questions myself, just to refresh my own mind. I don't know that I am any too clear on

[fol. 397] the operation of this valve. This is what you were calling the main valve?

A. Yes.

The Court: In its closed condition the contrivance is descending into the well?

A. Yes.

The Court: And of course this is air, immediately below that?

A. No; that is the fluid.

The Court: Is there fluid up to that point?

A. Yes, there would be fluid up to there.

The Court: There is no fluid above that, though?

A. No.

The Court: None above that?

A. No. That is an empty chamber.

The Court: This is an empty chamber from the main valve up to the trip valve also, isn't it?

A. Under different conditions, although there are times when we put that main valve away up the string of pipe, and it is up here so that the enormous pressure in the well won't collapse it.

Mr. Boyken: There is no fluid above the trip valve.

The Court: What closes the main valve?

A. When this moves down and compresses that spring —we will assume for the moment that this structure right through there is rigid, and this is obstructed in the hole or on its seat, temporarily obstructed accidentally going in, and this will be temporarily held, and that member will move on its seat like that.

The Court: In other words, the members down here will remain fixed and this will move?

A. Tend to move.

[fol. 398] The Court: Downward?

A. Yes.

The Court: And that opens that valve?

A. That is right.

The Court: Immediately, then, the mud, because undoubtedly mud will be in this "rat-hole", will go up and form part of the fluid that ultimately you will test?

A. Yes; but you are going to get mud in that column ultimately anyway, because you have entrapped some in the lowering. You don't really have an uncontaminated sample of this pure oil or pure salt water.

The Court: After that is firmly seated you open your trip valve?

A. Yes. You have then a passageway up through here, around through there, and on up, and when the trip valve pops up then you have a continuation of that fluid pressure up into the——

The Court: All right. Why does not the force of the liquid cause that main valve to be closed?

A. Because you have all the weight of the drill pipe——

The Court: Against it?

A. —against it, and it is sufficient to compress this spring—it is about a 20,000 pound spring, a spring like is on a box car—and you have to raise that much weight to compress that spring, and that weight will hold the valve open until you deliberately release the pressure.

The Court: And you depend upon the portion above the trip valve for your test?

A. You would have the portion to here for your test, in reality, back to the main valve, because the trip valve would be open, and the column of your sample would be from here up to the point to which the pressure took it.

[fol. 399] The Court: But your main valve is not closed?

A. It is closed when you start to take it out, and that is the only time it would have to be closed, because that is the time at which you entrap the sample.

The Court: It does close when you start up?

A. Yes.

The Court: Then you have your material to be sampled extending clear from the main valve up as far as you like?

A. Up as far as the pressure in the formation took it. We will say that this valve opened accidentally coming down, and you would have whatever happens to be in the well standing there before you take your test, but afterwards it stands from there up.

By Mr. Boyken:

Q. At the time of adjournment last evening, Mr. Abbett, you were tracing the fluid in the Johnston tool as the tool was being lowered into the hole, and also as the tool was coming out of the hole with the test. Will you please refer to the chart that is before you and trace that fluid on the chart itself?

A. When the tool is being lowered into the hole the main

valve, indicated in yellow, may be in one of two positions. It may be in the position indicated at A or it may be in the position indicated at B, depending on whether or not the packer encounters any obstruction on the way into the hole which would resist the downward movement of the packer and allow the main valve temporarily to open. In that event fluid would come through the perforations, up through here, and around through there, through the main valve and upwardly to the trip valve.

[fol. 400] Q. You are now speaking of the second figure from the left-hand side of the chart?

A. Yes. And I have designated the flow of fluid. That flow of fluid would be the same flow as will take place when the valve is seated on the seat at the point at which the test might be made, or is to be made, but it might occur, due to obstructions encountered, at any time going into the hole. Then, after the packer is set, as shown in the second view, entitled "Set" at the upper end, and the fluid has reached the point designated as C on that second view, the device is ready to be tripped. At that time we will assume that the packer has wedged itself into the shoulder at the top of the "rat-hole" and that the column of fluid in the well, entirely to the top of the well, is standing above the packer and is excluded from the "rat-hole" area. When we know that this packer has been firmly seated, and that is ascertained by the fact that observation at the top of the hole will show that there is no fall in fluid, and that the main bore is in fact closed, so that the fluid column is standing stationary, then the weighted rod is dropped and the trip valve is opened, so that the fluid, which is either formation fluid or the drilling mud entrapped in the "rat-hole" when it was sealed, will pass upwardly from this level C and pass into the trip valve and on up the well, on up the drill pipe, so that we are now taking a sample.

Q. Will you just answer this one question, Mr. Abbett? Where is the sample chamber in the defendant's device? How far does it extend?

A. The sample chamber is the drill pipe that extends to the top of the well.

[fol. 401] The Court: And above the trip valve?

A. And above the trip valve.

The Court: Yes.

By Mr. Boyken:

Q. Now, Mr. Abbett, I want you to take up the Simmons patent. Yesterday I read an apparatus claim of that patent, and I am now going to read a method claim, selecting one of the two method claims, that is, claim 8.

The Court: This is the defendant's patent?

Mr. Boyken: This is the plaintiffs' patent, the Simmons patent.

Q. (Continuing.) I am going to read this claim and ask you if you find the elements of this claim in the defendant's device, and you may refer to that chart before you while I read the claim, claim 8: "A method of testing the productivity of a formation encountered in a well." Now, does the defendant's device, as it is employed, consist of a method of testing the productivity of a formation encountered in a well?

A. Yes; it is employed both to test the productivity of a formation and to make tests of water leaks in the set casing, in other words, water shut-off tests.

Q. Those latter tests, are they formation tests?

A. No. They are testing the sealing of the casing at the lower end.

Q. Now continuing, "containing drilling fluid."

A. Yes, the well contains drilling fluid of necessity.

Q. "which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation." Does the defendant do that?

A. Yes, the empty string of pipe being the pipe on which the testing tool is suspended.

[fol. 402] Q. It is always adjacent the formation?

A. It is adjacent the formation in making a formation test but it is in the casing while making a water shut-off test.

By the Court: I am not entirely clear as to that. You say it is adjacent to the formation when making a formation test?

A. Yes, sir.

Q. You are speaking now of what? Of the drill pipe or your device?

A. Will you please read that question again?

By Mr. Boyken:

Q. I was going to read the claim up to that point which is the subject matter that we are talking about. "Claim 8.

A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation."

A. That states that the empty string of pipe would be lowered down the well to a point adjacent to the formation. In a water shut-off test it is lowered to a point within the casing and remains within the casing but is not at a point adjacent the formation. The formation is below it.

Q. Could you make that any clearer by referring to Defendants' Exhibit C in this case, showing the difference between a casing test and a formation test?

A. By reference to Exhibit C, it will be seen that the first view is entitled "Casing test, water shut-off," and in that view there is shown the section of casing and the drill pipe is there designated as lowered into that section and [fol. 403] the packer set adjacent the wall of the casing above its lower end to test the effectiveness of the seal of cement which is indicated around the casing and standing up within the formation bore. That is the water shut-off test, in which they are testing possible leakage here, in conformity with the rules and regulations of the State. In the other two views, next adjacent the one I have just referred to, there are shown two types of tests where the tool is lowered to adjacent the formation, and the packers, as are here shown, one being a straight hole packer or sleeve packer, that packer is in physical contact with the formation and the side walls of the bore, and the other, being a "rat-hole" packer, is in physical contact with the seat at the mouth of the "rat-hole" and in physical contact with the formation. These two views, showing formation tests, as designated below, are tests in which the packer comes in physical contact with and makes a positive seal-off between the formation area below and the formation area above.

Q. I read a portion of the method claim, and I will continue. "the pipe carrying a packer." In the defendant's device does the pipe carry a packer?

A. Yes. A packer is suspended from the pipe.

Q. "and having a valved inlet at its lower end which is closed while the pipe is being lowered."

A. That phrase says that the pipe carries a packer and has a valved inlet at its lower end.

Q. Where is that valved inlet in the defendant's device?

A. The valved inlet in the defendant's device is the trip

valve. It is the inlet at the lower end of the pipe and is the [fol. 404] valve which controls the inlet of fluid to the pipe. Without that valve opening there would be no inlet into the pipe.

Q. Continuing the claim, "setting the packer above the formation to seal off the drilling fluid from the formation."

A. That is shown. The packer sets against the formation and above the formation area which is to be sealed off so that the drilling fluid will stand above the packer and be excluded from the formation area to be tested.

Q. Suppose there was a shut-off test being made?

A. With a water shut-off test the packer would be set within the casing and above the cement joint which was to be tested.

Q. Continuing the claim, "opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe."

A. That is opening the valved inlet after, or the trip valve after, the packer is set to permit the fluid to come into the pipe, that could not get in unless that valved inlet was open to permit it.

Q. Continuing, "closing the valved inlet against the entrance of fluid from the well by movement of the pipe."

A. We never close the valved inlet after it is once opened because the structure is to remain open to give evidence of the test.

Q. You are referring, now, to the trip valve?

A. To the trip valve.

Q. What valved inlet is closed in the defendant's device?

A. The main valve is closed in the defendant's device but that is not necessarily the inlet valve because that valve [fol. 405] may open or close at any time as the device goes into the well. And its opening and closing does not of itself permit any fluid to come into the pipe but it is closed by movement of the pipe and the spring that assists that movement after the structure has stood for a desired period of time to permit the fluid to flow into the pipe.

Q. What is the principal function performed by the main valve so-called in the defendant's device?

A. The purpose of the so-called main valve is to entrap the samples when it is closed as shown in this chart and designated as coming out, the column of fluid then extending from that main valve up through and around the trip

valve and up into the tube as far as the formation pressure caused it to rise.

By the Court:

Q. You say the purpose of the main valve is to entrap the sample?

A. Yes.

Q. Just how does it do that?

A. As seen in———

Q. The entrapment begins as soon as you begin to raise the drill pipe, does it not, or does it?

A. The entrapment begins as soon as enough weight is taken off of this spring by raising the drill pipe to cause the valve member indicated in yellow to move up onto the black seat.

Q. I would think it would move down rather than up. Why doesn't it move down?

A. You have the hole and the seat on which the packer is seated below you.

[fol. 406] Q. Yes. If that valve is open, why wouldn't the sample have a tendency to flow back through the valve instantly the pipe is raised?

A. For two reasons. That sample has been placed in there under the pressure of the fluid in the formation and, as long as the valve is open, it will be maintained in there in column under a pressure of the formation. That pressure forced it in and, as long as the valve is open, it will just keep it in there.

Q. Is the pressure from below what closes the valve?

A. No; the pressure below does not close the valve.

Q. I am not clear on what closes the valve. I have no doubt it has been explained probably more than once but I don't remember it right now.

A. When you lift up on the drill stem at the upper end of the well you eventually relieve sufficient pressure on this spring, and, if you will note, the spring is shown as compressed between a shoulder on the member that moves up and a shoulder on the entire structure that includes the packer. And that spring pressure, in addition to the weight of the string to the top of the well, is normally exerting its force to hold the valve member indicated in yellow and the outer housing carrying the valve seat, indicated in black, to hold them with the valve member downwardly. Then,

when you pick up on that string of pipe until this spring is holding that entire structure downwardly, and when sufficient pressure is relieved, the spring at the same time holding the outer portion, including the valve seat, downwardly, then the valve member will move up against that seat and seal.

[fol. 407] Q. It is actuated by the spring in moving up, is it?

A. The spring is holding the valve down.

Q. When the spring is compressed?

A. Yes.

Q. When the tension is relieved the spring, of course, goes back to its original position, and that puts the valve back to a closed position, is that correct?

Mr. L. S. Lyon: Your Honor, I don't want to interfere——

The Court: Perhaps somebody had better interfere.

Mr. L. S. Lyon: If you will remember Mr. O'Neill's testimony, it was brought out that the valve could be closed by lifting the pipe whether the spring was there or not. This head on the valve has to move up and the only way you can move it up is by lifting the pipe. The spring is holding this thing down here with the packer down. The spring can't push it any further. So the spring can't help raise it, and you have got to lift the valve head up until it hits the seat. That is what Mr. O'Neill said and it seems to me that must necessarily be true. It is all in the testimony.

Mr. Boyken: I have a little model here that I think might help us in showing that action.

The Court: When I tell you what I don't know you will probably be able to supply it. As I said before, I have no doubt this has been explained again and again but I am not clear on what closes that valve as soon as the pipe begins to rise.

By Mr. Boyken:

Q. Now, Mr. Abbett, will you answer that question, please? You have a model in your hand showing the interior section on this chart.

[fol. 408] The Court: Can't it be shown by reference to this?

Mr. L. S. Lyon: That really isn't complete, your Honor. That is diagrammatic.

The Court: Then let Mr. Abbett proceed.

A. I have in my hand a small model of a tool, with a portion of it cut away, of the wall, so that we can see what happened inside of it. Here is your anchor pipe at the lower end, and on it is the packer. It so happens that this packer is shown here as having a little play, but that is immaterial. The packer is on its seat, and this is held down here by the weight of the pipe above it.

Mr. L. S. Lyon: This spring is pushing down on this, isn't it?

A. Yes. If you turn it this way you will see that the spring which is acting——

Q. In pushing this down?

A. Will hold it down so that—now, when it is in this position with the weight on the seat, the main valve member moves downwardly, so that those ports shown in that yellow portion there on the chart are exposed to this interior here.

Mr. L. S. Lyon: That is because the packer can't go down any further? It is down just as far as it can go, and you lower the drill pipe to open that valve?

A. That is right.

Mr. L. S. Lyon: When you lift up on the drill pipe the spring is still pushing the packer down?

A. Still pushing it down.

Mr. L. S. Lyon: And therefore the only thing that closes the valve is lifting the drill pipe, the spring pushing or tending to push the packer down, and it can't go any further?

[fol. 409] Mr. Boyken: I would like to get the witness' version of this so that we can get it in the record.

The Court: Let me suggest, Mr. Lyon, let Mr. Boyken take charge here. Remember that you are explaining to me what makes the valve close, and of course that is the business of the defendant to do. Now go ahead. I am far from understanding it now.

The Witness: Well, your Honor, do you see how the fluid will be shut off when the valve is in closed position?

The Court: It is in closed position now?

A. Yes.

The Court: I understand that. The fluid is around in this chamber.

A. But it can't get any higher when it is in the position shown.

The Court: No.

A. When the weight is put on that valve opens.

By Mr. Boyken:

Q. Where does the fluid go?

A. It comes through the packer and up into a port above the packer, and then through these holes here.

Q. And then moves inside the chamber?

A. Yes.

Q. And out, and then goes up to the trip valve?

A. That is right.

Q. When it is closed where is it shut off with respect to the operation of the main valve?

A. The shut-off is right in this main valve, when those ports go back up in there.

[fol. 410] Q. Those ports are sealed, then, so that there is no further passage of liquid upward?

A. That is right.

The Court: They are sealed by reason of the pull up?

A. This lift up. This member is fastened right through and attached to the drill stem. You lift up and the spring holds the valve member downwardly until sufficient weight has been relieved from above to permit these two members to separate sufficiently to allow that play, at which time the valve is closed.

By Mr. Boyken:

Q. Now then, when that valve is open the fluid moves upwardly to the trip valve?

A. Moves upwardly to the trip valve.

Q. And that trip valve is opened by the——

The Court: I understand that.

By Mr. Boyken:

Q. All right. Then the operation of the main valve is caused by what—the movement of the pipe?

A. Is caused by the combined movement of the pipe and the action of that interposed spring.

Q. That opens and closes the main valve?

A. Yes.

Q. I was reading claim 8, Mr. Abbett, and I had almost reached the end. But let me repeat the last portion: "Closing the valved inlet against the entrance of fluid from the well by movement of the pipe." That is closed, I understand, by the operation of the main valve?

The Court: Is that not what you have explained?

Mr. Boyken: Yes, the operation of the main valve.

[fol. 411] Q. Now, the last part of it is, "Raising the pipe so closed to remove an entrapped sample and the packer from the well." Is that done in the use of the defendant's device?

The Witness: May I have the last question and answer preceding this?

Mr. Boyken: That goes quite a ways back.

Mr. L. S. Lyon: That has nothing to do with this.

A. All right. It is my understanding that the statement was made a moment ago that the movement of the spring in the pipe closed the valve inlet, and I didn't make that statement, as I recall it.

Q. What is the fact?

A. The fact is that I have testified that I considered the trip valve to be the valve inlet for receiving the sample, and the pipe doesn't move to close that valve inlet. The pipe, if anything, in its movemet closes the main valve, which is the sample entrapping valve.

Q. The trip valve, as I understand, cannot be closed?

A. No.

Q. Now, that is clear. I guess that finishes the claim.

Mr. L. S. Lyon: Well, you haven't answered the question. The witness interfered and put up an argument about whether the trip valve or the main valve was the valve that opens and closes, and didn't answer the last question at all.

The Court: The witness has clearly designated the trip valve and what the witness calls the main valve.

Mr. L. S. Lyon: Yes, but he was asked a question as to whether or not, in the operation of the defendant's device, [fol. 412] after the valve had been closed you raised the pipe to remove an entrapped sample and the packer from the well. He hasn't answered that.

The Witness: I thought I had been misquoted, and I wanted to get that straight.

By Mr. Boyken:

Q. Let me read you the last part, then, of claim 8, "Raising the pipe so closed to remove an entrapped sample and the packer from the well."

A. Yes. That device of Johnston, after the sample has been entrapped in there not by closing the trip valve or the inlet valve, but by closing the main valve, when the sample has been entrapped in there, it will be removed from the well within the pipe and the packer will be carried with it, if there is any packer left in the hole to get out. Sometimes the packers are torn and mutilated so badly that parts of them remain in the hole, but to all intents and purposes they intend to take the packer out.

Q. Are you familiar with the Halliburton "J" slot device in evidence in this case?

A. Yes.

Q. Yesterday in going over the prior art we encountered a number of flow devices, which you pointed out. Will you please state what is meant by "flow device" as it appears in the prior art?

A. A flow device, as it appears in the prior art, is a structure including, primarily, a tube, as shown in the sections out of the Chamberlin Government report, a tube which extends into the well and is provided with means for closing off an area of the formation from which the desired fluid is to be obtained, so that the water or other fluids in the well [fol. 413] are excluded from the formation, and so that the pressure of the column of water or other fluids in the well is excluded from the area to be tapped or from which the productive fluid is to be taken. This insures that the pressure of the undesired fluids which may be in the well and their contamination will be excluded from an area of the formation, so that, either by the pressure of the fluid in the formation or by pumping operations, these fluids may be drawn from the lower confined area through the upper portion of the well, without any contamination and while utilizing the pressure of the formation in removing those fluids into the pipe, or while utilizing some pump means for drawing those fluids into the pipe. In either event it is necessary in a flow device, as will be evident, that there must be a shut-off between the area from which materials are intended to be extracted from the fluid and the remaining upper portion of the well.

Q. What instrumentality causes that shut-off?

A. Some form of packer.

Q. Is a packer essential, in your explanation of a flow device?

A. Yes.

Q. Why is that necessary?

A. That is necessary in order to exclude all of the other liquids and fluids which might occur in the well from the area from which the desired fluids are to be obtained, and that was the practice, as shown in the Government publication, and is the practice now used in connection with oil well production.

[fol. 414] Q. If you had no packer could you get the fluid to flow up through that interior pipe?

A. It would, of course, be evident that if we introduced a free pipe down into a well, by suction of a pump mechanism or by the pressure of fluid, if it was sufficient, fluid would flow into that pipe and could be withdrawn from the well. But in well structures where it is desired to obtain the fluid from a specific area it would be necessary to pack off the remaining length of the well from that area.

Q. Does the Franklin device, as shown in the patent, illustrate a flow device?

A. It describes a flow device and states that this structure is a valve for such a device.

Q. Now, Mr. Abbett, have you caused to be made a model of the Simmons device as shown in the patent in suit?

A. I have.

Q. How does that differ from the other model that is in evidence and Exhibit No. 9?

A. The main difference is that in the Simmons patent drawing there is an arcuate relieved portion on the upper valve element which is exposed to the fluid outside, and a stop pin on the lower valve element which is also exposed to the fluid outside, and in the device Exhibit 9, and also the model which I have seen, these members are cut in the face, and the outer wall of the structure would be perfectly smooth. Otherwise the model I have in my hand completely illustrates the structure of the Simmons patent as shown in its drawing, this being a coupling to which the tubing would be placed, and is not shown in the drawing. That is merely [fol. 415] a coupling that would be on the upper end of this member to connect to such tubing or drill pipe above. The

ports are through this device so that they would be moved to their two positions.

Q. You needn't explain that, because it is already in evidence. But the difference, as I understand it, is the exposed slot and the pin?

A. And the pin.

Mr. Boyken: We offer this model of the Simmons device in evidence.

(The model was admitted in evidence, as Defendants' Exhibit L.)

By Mr. Boyken:

Q. Have you also a model of the Franklin device as disclosed in the Franklin patent?

A. Yes. And that model is made in accordance with the drawing in the patent, showing the valve members that can be found within it, and indicating the stop means to limit its rotation so that the valve ports may be brought to an aligned or misaligned position.

Q. Now I hand you Defendants' Exhibit J, which is the packer concerning which you have already testified, and ask you if that is substantially the form of packer that was known in the time of Franklin.

A. This packer, which has already been introduced in evidence, was the Armour packer shown in Carll's report, and we prepared a thread so that the Franklin tool of 1882 could be mounted on the Armour packer, patented in 1875, as showing the Franklin tool mounted above the packer, both structures being of 1882 or earlier.

Mr. Boykin: We offer in evidence the model of Franklin patent, which is now assembled with the model already in evidence as Defendants' Exhibit J, and ask that the model [fol. 416] of Franklin be marked defendants' exhibit, the next letter.

Mr. Richmond: I object to it because it isn't made in accordance with that. He can't justify that upper portion of the device.

Mr. Boyken: The witness said that it was made. Now you may cross-examine him on it at the proper time.

The Court: I was going to say that I understood him to say that the upper portion was the Franklin device.

Mr. Boyken: Yes, your Honor.

The Court: Did I understand him correctly?

Mr. Boyken: That is right.

The Court: And he attaches the Franklin device to another device that was known at that time?

Mr. Boyken: The Armour patent.

The Court: But that is not an instrument or device designed in any one patent or shown in any one patent, is it?

The Witness: No, it is not, but——

Mr. L. S. Lyon: I object to this argument. That is for counsel.

Mr. Boyken: Let me answer your Honor's question. The upper portion, the witness said, is a model made in accordance with the Franklin patent.

The Court: Correct.

Mr. Boyken: The lower portion is already in evidence as a packer that is illustrated in the prior art as of the same date as the Franklin patent.

The Court: It is already in evidence, is it?

[fol. 417] Mr. Boyken: It is already in evidence in this case, yes, your Honor. The tag here is marked Defendants' Exhibit J.

The Court: Now, you combined the two, and you are offering that as a new exhibit?

Mr. Boyken: No, your Honor. I am merely offering the Franklin portion, the new portion. The other one is already in evidence.

Mr. L. S. Lyon: We would like to reserve the objection. We will have to establish the basis for it on cross-examination, your Honor.

The Court: Well, let the objection be overruled now.

Mr. L. S. Lyon: An exception.

The Court: I am a little bit in doubt about the attaching of one exhibit, which is admissible, there is no question about that, to something already in evidence. I don't know exactly about that. That is a little bit new, it seems to me, isn't it?

Mr. Boyken: Well, we have two exhibits here. One is in evidence and one we are offering in evidence, and we are physically attaching these two things.

The Court: This is the true situation, that counsel may very readily take the Franklin device and show how it operates attached to it, by way of argument. Strictly, I don't believe that the combined instrument is admissible as

such, so, in order to make it admissible, you have got to detach it.

The Clerk: That will be Exhibit M.

The Court: I think that is the correct view to take.

Mr. Boyken: Very well. We will detach it.

[fol. 418] Mr. Boyken: Before Mr. Lyon cross-examines I think perhaps we ought to have this diagrammatic drawing, on which the witness has made certain markings, in evidence in order to illustrate his testimony and I offer it as Defendants' Exhibit N. That is all.

The Court: Very well. Let it be admitted.

The Court: Let me ask a question here. Is the defendant's device patented?

Mr. Boyken: Yes, your Honor.

Cross-examination.

By Mr. L. S. Lyon:

Q. Mr. Abbett, you are a professional witness in patent cases, are you not?

A. Well, now, I don't know how you would term the word "professional." I am, of course, paid, and in the course of twenty years' patent soliciting I think I have appeared as a witness six times.

Q. You are employed by different people to testify for them in their patent cases, is that right?

A. Yes.

Q. You testify in a patent case if you are employed in it, irrespective of whether it relates to the oil industry or some other industry, don't you?

A. I have appeared in cases other than the oil industry.

Q. What other kind of cases?

A. In 1923 I appeared in a case relating to automatic can machinery, the machinery having been drawn by me. The cases that I have appeared in in recent years, which have been four, as I recall it, have all been in connection with the oil industry.

[fol. 419] Q. You never have testified in any patent case involving anything except the oil industry with that one exception of that automatic can-making machine?

A. I said there were six cases in twenty years. As I recall it, there was another case, which was an automatic baking machine.

Q. Let's see. Are you just as much an expert in the can-making business as you are in the oil industry?

A. I haven't qualified as an expert in an industry. As I understood, I qualified as being thoroughly familiar with patents due to my experience and my work in connection with investigating such matters.

Q. Did you qualify just as much in that can-making machine case as you have as an expert in this case?

A. Yes; as to knowing what the patents and the art and the literature said.

Q. And also the same thing is true with this baking machine case that you were in?

A. Yes.

Q. You testified in the trial before Judge Bryant, covering largely the same matters that you have covered here, did you not?

A. I did.

Q. In regard to this same tool and the Simmons patent?

A. Yes.

Q. Were you employed in that case by this defendant in this case?

A. No; I was not. I was employed by the Johnston Formation Testing Company of Texas.

[fol. 420] Q. And in this case you are employed by whom?

A. I am employed by the M. O. Johnston Oil Field Service Company.

Q. And paid by them for your testimony?

A. Yes.

Q. Is there any difference between drilling fluid that is used in drilling an oil well and the fluid that the well itself can produce?

A. The term "drilling"——

Q. Will you just answer that yes or no and then give any explanation?

A. That is very difficult to answer by yes or no. I will be glad to explain what I consider the mud at the well to be, as it is known in the industry at the present time.

Q. I am not asking you to make an argument or to consider something. Do you know what rotary mud is that is used for drilling a well?

A. I do.

Q. Do you find that naturally produced by an oil well?

A. Yes; I find that naturally produced by an oil well. The mud at the well will run about 1.2 in weight but the rotary mud, as it is termed at the present moment, often contains an additional material which is a weighting material.

Q. You say these flowing wells produce mud?

A. I didn't say flowing wells produce mud.

Q. I am talking about a flowing well. Does it produce drilling mud?

A. No.

[fol. 421] Q. What is it in the operation of drilling a rotary well that creates the pressure in the well that may hold back natural fluids that are seeking to gain access to the well?

A. The drilling fluid.

Q. And that drilling fluid is different from the natural fluids that you are interested in detecting, is it not?

A. It may be the same fluids with an additional amount of mud that is found at the well, or, when one is to be made heavier, an additional amount of weighting material.

Q. What does a flowing well produce?

A. What kind of a well is it?

Q. I am asking you. You testified about flowing wells here. A flowing well supposed to be in an oil field.

A. If it is a water well, it will produce water, and, if it is an oil well, it will produce oil.

Q. Where they put these flowing devices in flowing wells what is the well producing?

A. It is usually producing a fluid which is under pressure.

Q. I know that but what fluid?

A. It would depend on what kind of a well it was. It would produce any kind of a fluid that was contained within the well.

Q. Do you know what a flowing well is out in the oil fields?

A. Yes. A flowing well in the oil fields is a well usually that produces either oil or gas.

Q. It is not producing rotary drilling mud, is it?

A. No.

[fol. 422] Q. Is there any rotary drilling mud in a flowing well when the well is equipped to produce?

A. When it is equipped to produce?

Q. Yes. When you find you have a flowing well and you equip it with these flow devices is the well filled with rotary mud?

A. Very often the testing devices are in wells when they produce.

Q. Is there a difference between a well that is being drilled and a well that is on production?

A. Yes.

Q. What is the difference?

A. The difference is that when a well is on production all drilling operations have ceased and it has been set up and equipped to extract from that well whatever material might be in it.

Q. Are these flow devices that you referred to a few moments ago installed in producing wells or in drilling wells?

A. In the literature it shows them installed in both wells being drilled and wells that, as you term it, are on production.

Q. Do you know from the Franklin patent whether he is referring to the use of his device in a producing well or a drilling well?

A. I don't know.

Q. You don't know?

A. No, because from an examination of the technical literature which has been produced here——

Q. You don't have to argue with me why you don't know. Just say you don't know.

[fol. 423] Mr. Boyken: Just a minute. I would like for the witness to be permitted to answer the question.

The Court: Yes. Let the witness continue his answer.

A. I don't know because from the technical literature which has been produced here Carll describes the practice at the time of Franklin and says that the flow structure or flowing device, including a tube and a packer, was put into the well and taken out many times during the operation of drilling the well. So that I do not know whether, when Franklin provides a device which he says he prefers to put in the well closed and take out of the well opened, he was trying to perform one of the tests of Carll or was flowing a well.

By Mr. L. S. Lyon:

Q. If he was flowing a well, he was not confronted with any problem of sealing off the well so as to separate the natural fluids that the well could produce from drilling mud, was he?

A. Not from drilling mud but from the rest of the liquid that was in the well.

Q. That would all be the natural fluids in the well, would it not?

A. Yes.

Q. And he wouldn't have to test the well to know the well would produce those, would he? They wouldn't be there unless they were naturally produced?

A. Will you please read that question?

(Question read by the reporter.)

Mr. L. S. Lyon: Strike that last part out of the sentence. That doesn't make it any clearer

Mr. Boyken: Now, will you read the first part of the question?

[fol. 424] A. Wasn't a part of that question ahead of that?

Mr. L. S. Lyon: No.

A. All right. Then, please read that one.

(First part of question read by the reporter.)

A. He wouldn't have to test the well to know that there was fluid in the well but, if it was essential for him to know the difference between fluids coming from different strata of that well, he would have to make a test to exclude one portion of that well from another. And, if he was drilling an oil well, he would want to exclude all the native fluids in the well from the testing zone so that he could ascertain what was in that zone.

Q. But there wouldn't be any fluid in the Franklin well except the fluid that was produced by the well, isn't that correct?

A. If the well was on production, no.

Q. Isn't that the way it is described in the Franklin patent?

A. I stated that I couldn't tell from the Franklin patent whether the well was on production or that he was using this

device in it and making tests in order to ascertain the condition of the well.

Q. Where do they get the rotary mud to drill an oil well with? Do you know?

A. Yes.

Q. Where?

A. At the present time they get the rotary mud from concerns who sell a product which is known in present days as rotary mud, and it is mixed with liquid in the well and causes it to fill.

[fol. 425] Q. And it is manufactured and put down the well, is it?

A. Yes. It is ground and put in the well.

Q. That is the mud that creates the hydrostatic pressure during the drilling of the well, which may hold back any natural fluids that you encounter as you drill the well, so that you don't detect it at the top of the hole, isn't that right?

A. That is the mud they use now. Carll described putting mud—or mixing water with the mud that was in the hole during drilling.

Q. The Simmons patent and the method of that patent and the purpose of it are to be able to get the sample of those natural fluids notwithstanding that rotary mud, without having to take that rotary mud out of the hole, isn't that correct?

A. Yes. It is to enable you to get a sample of the native fluids in the formation as excluded from anything that might be in the hole.

Q. But particularly——

Mr. Boyken: Just a minute. Finish your answer, Mr. Abbett.

A. I understood Mr. Halliburton to say that any liquid within the hole excluded would be an infringement and, therefore, I make the statement that the structure would exclude any liquid from the testing zone.

By Mr. L. S. Lyon:

Q. But the object of the method described in the Simmons patent is to enable you to overcome the pressure of the mud fluid without removing the mud fluid or drilling fluid from the well and still get a sample of whatever natural fluids the [fol. 426] well might produce if it wasn't for the pressure of the drilling mud, isn't that correct?

A. That is right; and equally applicable to any other kind of fluid that might be present.

Q. There is no such drilling mud to separate from the natural fluids in a producing well, is there?

A. Not in a producing well.

Q. Therefore, you don't know whether there was any such drilling mud in the well the Franklin patent refers to, do you?

A. No; I don't know that there was drilling mud there. And, in view of the description of Carll, I do not know that it was not there.

Q. At the date of the Franklin patent it was the practice to case the wells with a casing, was it not?

A. At some times.

Q. And to set those casings with a packer, was it not?

A. It was. But the casing did not always extend entirely to the bottom of the well, as shown in illustrations from the Pennsylvania reports to which we have referred.

Q. I will show you Figure No. 2 on this report No. 3, Plate 14, which is in evidence here in the publication that you referred to. Does this illustrate a well in which casing has been set with a packer on the casing?

A. It does.

Q. And it shows also within that casing and extending through it down into the well a tubing through which the well is to produce, does it not?

A. Yes.

Q. And there is no packer on that tubing, is there?

A. Not in the center view but there is in the view at the extreme left.

[fol. 427] Q. This view at the extreme left shows no casing in the well, does it?

A. It has this length of casing here, which goes down to bedrock.

Q. That is the surface pipe?

A. Yes; that is the surface pipe.

Q. You would distinguish surface pipe from a casing that is used as a water string and set with a packer to shut off the water?

A. Yes. But we have been using the term "casing" rather indiscriminately here, even including, as designated in the Simmons patent, where it states casing and may mean casing or drill pipe.

Q. What does Carll say this surface conductor is that you referred to in Figure 1? What does he say it is made out of?

A. That may be made of wood.

Q. He said it was made of wood, didn't he?

A. Yes; he did.

Q. And there was no pipe in this well at all except this one tube?

A. That is right. And from the wooden portion down was open formation against which the packer set.

Q. And those were small wells, were they not?

A. Yes.

Q. What they call small wet wells in Pennsylvania, isn't that right?

A. That is right.

Q. The full size of the hole of this well here is 4 inches, isn't it?

A. Yes.

[fol. 428] Q. On the other hand, where they used a casing with a packer to shut off the water, they called the well a large or dry well, didn't they, as distinguished from this small wet well?

A. They did in some cases; yes.

Q. That is what they are called in these reports you had here, aren't they?

A. Yes; they are called that in these reports.

Q. So, therefore, it was common practice in Pennsylvania at the time in question to drill a well, put in a string of casing to shut off the water and set that casing with a packer, and then put a tubing in the well through which the fluid flowed in production, and have no packer on that tubing? That is correct, isn't it?

A. In view of the——

Q. Can you answer that yes or no?

A. I can't say whether that is correct or not. I can say that is what it shows in the view here, that that is what was done in connection with well No. 2. That casing was run part way down and packed by a packer, and that an unpacked tube was extended through it. In well No. 1 the well was partially enclosed by a tubing member and the tubing extended downwardly and has a packer on the formation.

Q. Is there any statement in the Franklin patent which discloses whether or not his device is to be employed in what

was known as the dry, large type of well or the small wet type of well?

A. No; other than it was used in connection with a well that had a packer in it.

[fol. 429] Q. And that packer may have been on the casing as far as you can tell from the patent? That is necessarily true, isn't it?

A. No.

Q. You don't know what type of well it was?

A. No; I don't know what type of well it was.

Q. If it was the type shown in this exhibit, Figure No. 2, that you have just referred to, there could have been a packer in that well on the casing, isn't that right?

A. There could have been a packer on the casing, but that would have no reference to the point at which Franklin wanted to put his valve.

Q. How do you know? Does he say why he wants a valve above the packer?

A. No. But he wants to control the fluid coming through it.

Q. Does he say why he wants the valve positioned in the well above the packer?

A. He doesn't say that any more than Carll tells you why he wants the packer on the tubing in Figure 1 of this drawing.

Q. Do you know whether or not it would be safe to run a device like shown in the drawings of this Franklin patent in a well if you were going to allow the device to be lowered down below the casing, if there was a casing in the well, set with a packer? Do you know enough about the business to tell that?

A. No. I wouldn't answer that question.

Q. It may be possible that Franklin was directing you to keep that device above the packer so that you wouldn't [fol. 430] get down below and hang up and be unable to pull it out, isn't that correct, as far as you know?

A. I don't know.

Q. Franklin doesn't say anything in his patent about in which order you shall open and close his valve as compared to when you set or release a packer, does he?

A. No; he doesn't.

Q. He doesn't say anything about the packer being lowered into the well or pulled out of the well with the valve device, does he?

A. No; he does not. And my study of the file wrapper of the Simmons patent says it is immaterial whether the packer is pulled out or not.

Mr. L. S. Lyon: I move to strike the last as not responsive to the question, about the Simmons patent, your Honor.

The Court: Denied.

By Mr. L. S. Lyon:

Q. Claim 18 in this case calls for pulling this packer out with the Simmons valve, doesn't it?

A. 18?

Q. 8.

A. 8 does but 18 does not.

Q. But the Simmons patent very specifically says that you are to close the valve before you release the packer after taking a test, is that correct?

A. Yes; that is what it says.

Q. There is no such statement in the Franklin patent, is there?

A. No; there is no such statement in the Franklin patent. But he says he wants to close his valve before he removes the structure from the well, and Carll states that it was [fol. 431] common to put a tube with a packer on in the well and remove it many times during the process of drilling the well.

Q. You are unable to find in the prior art anywhere that anybody prior to Simmons ran a single string of pipe into a drilling well, the pipe carrying a valve structure for the lower end and a packer, and operable from the top of the well by movement of the pipe, so that you could set the packer above the formation to be tested to exclude the drilling fluid, so that you could open the valve, take a sample from the formation, and could then close the valve, thereafter releasing the packer and bring out the pipe containing trapped in it a sample of the natural fluid that was recovered below the packer?

A. I contend that I can find it.

Q. In which patent?

A. For the first patent I find it in Franklin, as disclosed by the condition of the oil and well-drilling art of that day, and the disclosure of the Franklin patent and the inter-

pretation that we have a right to make of that patent in view of the practice of that period.

Q. Do you say that that is specifically described in the Franklin patent?

A. I say that when Franklin——

Q. Just answer that yes or no.

A. Franklin doesn't use your words; no.

Q. He doesn't describe what I have stated in my question, does he, specifically in his patent?

A. No; not in those terms.

[fol. 432] Q. He doesn't describe that subject? You have said that you don't know whether he has a packer on that string or not.

A. I state that the Franklin patent——

Q. Just answer the question. Does he describe that subject or doesn't he?

Mr. Boyken: If your Honor please, I would like for this witness to answer the question and, if it is not responsive, it can be stricken out.

Mr. L. S. Lyon: It is cross-examination, your Honor, and the witness should not be allowed to evade?

The Court: Answer the question.

A. Will you please read it?

(Question read by reporter.)

A. And I answered Franklin.

Q. What?

A. I answered Franklin.

Q. The question is is that all described and can you point that all out, described in the Franklin patent?

A. Not in such words but that patent and every other patent is addressed to those skilled in the art.

Mr. L. S. Lyon: I object to the argument, your Honor.

Mr. Boyken: Will you permit the witness to answer the question? And what is immaterial can go out.

The Court: The witness may answer. Continue your answer.

A. That patent and any other patent is addressed to those skilled in the art, and I attempted to faithfully ascertain what the knowledge of a person——

[fol. 433] The Court: It doesn't make any difference what you did. You say that because of the fact you have recited,

that is, that the patent is addressed to those skilled in the art, you draw the inference that it does exist?

A. Yes.

By Mr. L. S. Lyon:

Q. Do you know how long it was after the Franklin patent issued before anybody ever did what I recited in my question?

A. No. I don't know they didn't do it then.

Q. In your practice as a patent solicitor and your wide acquaintance with the oil drilling industry that you have referred to did you ever see anybody doing it prior to 1926?

A. I wasn't associated with the oil industry at that time.

Q. Well, do you know of anybody doing it prior to 1926, when it was first introduced by Mr. Halliburton?

A. Do you mean by actually performing the operation?

Q. Actually practicing the method which I explained in my question.

A. I have had information that others have done it but I will not make the definite statement that I personally know it.

Q. You have tried in every possible way for some two years now to find something or everything that could be found that could be used as a defense against this Simmons patent, haven't you?

A. An effort has been made to locate prior uses, prior publications and prior patents; yes.

[fol. 434] Q. And today, since 1926, this method that I have stated in my question is in common use in the industry, isn't that true?

A. Yes.

Q. And you are unable to find anywhere prior to 1926 any definite proof that you can offer here in court of that method ever having been used? That is correct, isn't it?

A. No. I think that Carll and the other publications here show that the practices they employed at that time used such methods.

Q. That is the only proof you have, is that correct?

A. And in connection with the patent art.

Q. And in connection with any actual art?

A. Well, persons have stated that they used these methods but as to getting the proofs of them sufficient to bring them into court—we haven't obtained them.

Q. Didn't Mr. Johnston go into this business because it was something new?

A. I didn't know Mr. Johnston when he went into this business.

Q. You are testifying to the court that one skilled in the art would have been able to have told from the Franklin device, or from the Franklin patent and this other stuff that you have brought in here, that you say he would have added to it, that this was the way to test wells. Now, the proof of that is did anybody see that from those publications and patents.

A. I don't know.

Q. You don't know whether they did?

A. No.

[fol. 435] Q. Didn't you try to find out?

A. We tried to find out certain things relative to prior uses, yes, but as to whether they saw these publications or not we made no effort to determine.

Q. Do you think they used this method back there in Pennsylvania and then it became abandoned and was a lost art? Is that your idea?

A. No; I don't think it was a lost art.

Q. Do you know of any place it was used here in California throughout all the oil industry in California up until the knowledge of the Simmons invention was brought here?

A. No; I don't. But, as I understand it, there were transitions in drilling conditions from time to time which caused various practices to be used on those occasions as drilling practices changed.

Q. Until this Simmons method was brought to California how did they test formations in drilling oil wells in this State?

A. If I can rely upon information received, they tested them in some cases by the Cooper patent.

Q. Do you know——

Mr. Morgan: Do you mean personal knowledge and observation at that time?

Mr. L. S. Lyon: Yes.

A. No. I wasn't connected with the industry. I know that the common practice was bailing.

Q. The common accepted method was to set a string of pipe and cement it and bail out the drilling fluid and then see what natural fluid came into the well, isn't that right?

A. That wasn't the only method.

[fol. 436] Q. Well, that was the common method?

A. Yes; that was the common method. Another method was to——

Q. That was the only method that they had of testing the productivity of a formation, wasn't it?

A. No. They had another method, which was to set a string of pipe and a packer in the well at a depth and bail from the confined area, as described in Cooper.

Q. They had to bail by any of these methods before they got knowledge of this Simmons method, as far as you know?

A. As far as I know. Those were the practices in California as far as I know.

By the Court:

Q. One practice was to take out the fluid from the well and find out what was in the bottom of the hole?

A. Yes.

Q. And then the other practice was what?

A. The other one was to lower a string of pipe into the hole with a packer on it, so that they didn't have to remove all of that fluid, and then remove the fluid from the confined area by bailing or pumping.

By Mr. L. S. Lyon:

Q. That is what is described in this Cooper patent that you explained to the Court yesterday?

A. That is one thing that is described in it; yes.

Q. Do you have any actual, definite knowledge of the use of that Cooper patent anywhere? If so, when and to what extent? Do you know of your own knowledge of any such use?

A. If you will permit me to state that a man——

[fol. 437] Q. I don't care about your hearsay knowledge. Do you know of it being used?

A. No. I don't know that it was used in 1911; I wasn't in the industry at that time.

Q. Referring to the testimony you have given about what was in use prior to the disclosure of this Simmons patent in California, did you find the same situation to be true in Texas when you were down there in connection with that case?

A. Yes. I think that is a correct statement, that that was the general knowledge in the fields.

Q. As far as you know, the introduction of this method by Mr. Halliburton revolutionized the practice in the industry, is that correct?

A. I don't know how I could state that, as far as I know.

Q. Well, it may be true as far as you know?

A. Not knowing what the facts are actually, I couldn't say. All I could say is as far as I know anything may have been true on that subject because I wasn't familiar with the matter at that time.

Q. Then, your testimony that a man skilled in the art would have learned this thing from the Franklin patent, supplemented by this other publication material that you have brought in here, loses all force if in fact the industry didn't see or find that from those publications and that patent, isn't that correct?

A. My testimony was that a man skilled in the art could have learned it from the Franklin patent, and that is the rule which governs in connection with the prosecution of patent applications.

[fol. 438] Q. Would it make any difference in your opinion if in fact you knew that for fifty years nobody found in the Franklin patent and this other material the understanding of the Simmons method which you say would be apparent to them from it?

A. It wouldn't make any difference in my opinion because this is a patent and we are attempting to ascertain what the alleged inventor was charged with knowing at the time of this alleged invention.

Q. You testified regarding this Cox patent, Defendants' Exhibit H-13, before Judge Bryant, the patent there being Exhibit 25 in that case, did you not?

A. I did.

Q. Refer now to this patent to Cox, Exhibit H-13. That shows a two-string tester, does it not?

A. It shows what in this litigation has been referred to as a two-string tester, that being one string of pipe for obtaining the sample and another string of pipe for maintaining or establishing circulation.

Q. You are fully aware, are you not, that two-string testers are impractical and have not been successful in the industry?

A. I don't believe that I should answer that question. I have not qualified as an expert in the oil industry.

Q. Well, you might know that. I am not asking you to testify, if you don't know. But don't you know that fact?

A. No, I don't know that. I know that, just as is shown in Figure 2 of this three well exhibit, that they there put down two strings of pipe for various purposes.

[fol. 439] Q. That is the best answer you can give to the question?

A. I have got to answer within my own knowledge, yes.

Q. But, to your knowledge, has a two-string tester ever been operated commercially?

Mr. Boyken: If your Honor please, I object to that. Mr. Lyon objected to my questioning this witness regarding the commercial activities of these tools in the oil industry, and I think that question is improper.

The Court: Objection sustained.

Mr. L. S. Lyon: I am not asking him for the fact. I am asking him for his knowledge, and this witness has had charge of the search for the material to defend this case with for several years for this defendant. I would like to take an exception to the ruling. The witness testified on this point before Judge Bryant at page 724 of the record. He knew the answer then, and Judge Bryant allowed this very question.

The Court: There is nothing before the Court, Mr. Lyon.

Mr. L. S. Lyon: Your Honor ruled before I could present the authority for my question.

The Court: The correct procedure is to ask that the ruling be stricken out or withdrawn, and then you have an opportunity, but, if you have any intention of making any such request, I am not going to permit it. Go ahead.

Mr. L. S. Lyon: That is why I didn't make it. I would like an exception.

[fol. 440] The Court: Yes.

Mr. L. S. Lyon: And I would like to have the answer for the purpose of the record, under the rule that I referred to yesterday.

The Court: I think perhaps you are entitled to that, under the rule. I have examined the decision, and I am frankly of the opinion that the decision does not make the rule any plainer than it is. I think the rule itself is plain only to this extent, that the court is at liberty to allow the answer to be made or to give such explanation as will render the exact answer not necessary. That is clearly what the rule

says. You may have the answer in this case, but the answer is not evidence in the case.

Mr. L. S. Lyon: I will repeat the question, as I am reading it.

Q. To your knowledge, has a two-string tester ever been operated commercially?

A. I was advised, but to my personal knowledge—I think that is the way the question was asked in Texas—I was advised that a two-string tester was operated by Mr. Edwards, but I don't know that. I was told.

Q. But to your knowledge there has been no commercial operation of a two-string tester?

Mr. Boyken: I object to that, your Honor.

The Court: Say yes or no, and this will be deemed to be answered.

A. I don't know.

[fol. 441] (Cross-examination resumed, after an interruption to take the testimony of other witnesses.)

Q. Mr. Abbett, when your cross-examination was interrupted you had started to discuss the Cox patent. I believe you have already testified that the Cox device is a two-string device. The next question I wish to ask you is whether or not there is any teaching in the Cox patent of recovering an entrapped sample, and by an entrapped sample I mean a sample that has been received within the test string and a valve closed so that the sample is removed from the well by raising the pipe with the valve closed.

A. I consider from a study of the Cox patent that it does disclose the recovery of an entrapped sample.

Q. Does it so state?

A. Yes. He states that he provides a means for procuring and bringing to the surface a small quantity or sampling test of such oil, sand, water, or whatever is in the path of the drill bit as there is for inspection and analysis.

Q. Is there any valve in the device of the Cox patent which can be closed after the sample has been received to exclude the drilling fluid while the pipe is being raised out of the well?

A. The——

Q. If you will answer these questions yes or no, and then give your explanation if they require explanation, we will get along faster.

A. No. There is no valve which will exclude the drilling fluid from the sample chamber after a test has been taken, but there is a valve which entraps the sample and holds it [fol. 442] within the test chamber while it is being withdrawn from the well.

Q. But that valve will not exclude the drilling fluid while the pipe with the sample in the pipe is being withdrawn from the well, is that correct?

A. That is correct. You would have your entrapped sample at the top of the sample chamber and the pressure of the fluid within the well after the packer is lifted off of its seat as you withdraw would cause a column of drilling fluid to come under the entrapped sample and to be raised within the test chamber and there caught by the trap valve with the sample or test sample disposed above it within that chamber, and there would be two columns of fluid, the upper column being the sample and underneath it would be a column of the mud fluid, both being entrapped within the pipe.

Q. And, depending on circumstances, the extent to which that sample and the drilling fluid were mixed would be indeterminate, isn't that correct?

A. That is correct as I am advised, except that the different fluids that flow into the test chamber classify themselves normally in the order in which they go into the chamber. And due to the relatively small cross-section of the column they remain in substantially that classification as the tubing is withdrawn.

Q. Do you see any objection to allowing the drilling fluid to enter the test string after the sample has been taken and while the device is being removed from the well?

A. No. As far as getting what Cox said he wished to get was a sample of the fluid within the well, for any practice we know that with all of the test tools drilling fluid [fol. 443] does go into the sample chamber during the operation of taking a test.

Q. Then, you think there is no advantage in having a valve on the tester which will exclude the drilling fluid while the test is being removed from the well?

A. I wasn't asked that question but I will answer it. I think there is an advantage in having a valve for sealing the lower end of the test string.

Q. What is the advantage?

A. The advantage of that is that the quantity of material within the string will be identified as having completely entered the test string before the packer was raised from its seat.

Q. The only valve that exists in the Cox device after the sample has been taken and the device is being removed from the well is the check valve 15, isn't that correct?

A. Yes.

Q. And that check valve is operative to prevent fluid from flowing down the test tube 13 but not operative to prevent fluid from flowing into the test tube 15, is that correct?

A. Yes. It is a check valve which means that it will only obstruct the flow of fluid in one direction but the direction here provided is to entrap a sample.

Q. And, except at the top of the well, the superior pressure is imposed from without the tube 15 by the drilling fluid, isn't that right?

A. I don't understand the question, Mr. Lyon.

Q. The force exerted by the drilling fluid or the pressure of the drilling fluid tending to cause the drilling fluid to flow into the test tube 13 by the valve 15 is greater than the pressure exerted by the sample contained in the test tube [fol 444] 13 while the device is being removed from the well and except at the top of the well, is that correct?

A. Yes; unless the height of the column of fluid within the test string is greater than the height of the column of drilling fluid within the well at any particular time.

Q. Ordinarily, in taking a test, when you release the packer the pressure from the drilling fluid greatly overwhelms the pressure of the sample that is in the test string, isn't that correct?

A. Yes. But in this particular case we are dealing with two columns of fluid, one that has accumulated within the test string and one which is on the outside. And when the seal is broken by taking the packer off of its seat those two columns of fluid within and without will equalize and reach a common level.

Q. The valve 15 will not exclude the drilling fluid upon release of the packer in the form shown in the Cox patent, is that correct?

A. No; it will not exclude the drilling fluid but will entrap such fluid as is within the test string. And, as we break

that seal, the two columns of fluid become equal, and then as we raise the test string the inside column will have been entrapped and will have a constant head while we are gradually decreasing the head of the drilling fluid within the well.

Q. To make it simpler, when you release the packer in operating the Cox device drilling mud would flow into the test string 13 by the check valve 15, would it not?

A. Yes; beneath the column of sample.

[fol. 445] Q. This perforated pipe 7, or I guess perhaps the pipe is 8 and it terminates in the plunger 7, is intended to penetrate into the formation, is it not?

A. I would like to refer to the patent on that because something is stated on that point. It states that it is, after breaking the closure, plunged into the bottom of the hole. It being a hole, I assume that the hole is open.

Q. The only method described in the Cox patent is that the perforated pipe shall be projected into the formation, is that right?

A. Do you mean physically imbedded in the formation?

Q. It will penetrate into the formation?

A. My understanding of that was that there was a hole beneath the packer which was in the formation, and that after the packer had been seated this penetrating member went down into the area defined by a hole in the formation, but I didn't understand that you were going to plunge the perforated member into the dirt of the body because there would be the opportunity to clog those holes and no sample would be obtained.

Q. Does the Cox patent make any statement regarding any "rat-hole"?

A. No. He doesn't use that term.

Q. Is it your testimony now that this perforated plunger 7 or 8, illustrated in the Cox patent, is intended to be lowered or projected into a "rat-hole" rather than to be stuck into the formation?

A. The only statement I find is the one I read a moment ago, that, with such impact, the sharp pointed member 7 is forced downwardly, and on breaking the closure 13a is plunged into the bottom of the hole. If the bottom of the [fol. 446] hole is directly against the end of the packer, it would be plunged there but it is my understanding that the

bottom of the hole was the area of formation to be tested and was a length of hole below the packer.

Q. Then, you state that it is not correct that the only method described in the Cox patent is that this perforated plunger 7 or 8 shall be stuck right into the formation?

A. No. I didn't say that that was not correct. I said I didn't understand the patent to be that explicit.

Q. I will read from your testimony before Judge Bryant at page 974 of the record in the Texas case. You were asked the following questions, were you not:

"Q.—This Cox device is not adapted or intended to operate by this perforated pipe being projected into a drill chamber into which the fluid from the formation flows, is it? It is supposed to be stuck right into the formation or ground itself?

"A.—That is one method that is used; yes.

"Q.—That is the only method described, isn't it?

"A.—Yes; that is the only method."

Did you so testify?

A. I did. And I state now that that may be one of the methods. If you recall in that case, we went to trial there on a very short bit of notice, and since that time I have looked these patents over somewhat more carefully, and I would not commit myself to stating that the patent when it says that it is extended into the bottom of the hole is definite as to whether that means penetrated into the dirt of that hole or into the bottom of the hole.

[fol. 447] Q. Doesn't the Cox patent actually state on page 1, line 70, that the lower end is a sharp pointed plunger 7 for piercing the formation at the bottom of the hole?

A. Yes; it does.

Q. Do you want to change your testimony in view of that having been brought to your attention?

A. Yes. I will state this, that at that place in the description it states that the member 7 is pointed for piercing the formation at the bottom of the hole, but looking into the other statement it says that it was plunged into the bottom of the hole; and in referring to that my contention is that that doesn't necessarily mean the physical end wall of the hole.

Q. Is it your testimony now that you were not prepared

properly to explain these prior patents at the trial before Judge Bryant?

A. No; that is not my testimony. My testimony is that I had attempted to fully study these patents and to attempt to ascertain what was in them, and that the statements I made there were made in perfect sincerity and with no intention to mislead the court there or here.

Q. How long an opportunity did you have to review these patents from the time you first went to work on them before you actually testified before Judge Bryant?

A. Such patents as we had——

Q. Take the Cox and the Edwards and the Franklin and the Cooper patents. You fully commented on those patents in an affidavit filed in Judge Bryant's court in that case about a month before the trial commenced, did you not?

A. Yes; about 25 days before, I think it was.

[fol. 448] Q. And then you were present at the trial, and the trial lasted for several weeks before you took the stand, isn't that correct?

A. Yes. But these patents in the prior art were not discussed during that period.

Q. But you had all of that opportunity to look at them, didn't you?

A. I did.

Q. And how long before you prepared the affidavit that I referred to had you been studying these patents?

A. I think this art had been accumulated all told about a month.

Q. Before the affidavit was filed?

A. Yes. But we had no notice at that time of any trial and the affidavit was prepared on the way to Texas.

Q. Could you use this Cox apparatus as disclosed in the Cox patent for making a water test in casing?

A. There would have to be the addition of an anchor pipe in order to do that because in making a water shutoff test with a sleeve packer you must have some abutment below it against which you can press.

Q. This Cox tester requires two strings to be lowered into the well, Nos. 1 and 13, does it not?

A. To make a test?

Q. The apparatus as described here embodies two strings?

A. The apparatus shows two strings; yes; an outer string through which circulation of the drilling fluid may be obtained down through the string and out through the open

ings 4 and into the well, but that pipe does not concern itself with the taking of a sample.

[fol. 449] Q. There is no such pipe embodied in the Johnston tester, is there?

A. There is no such pipe but provisions for circulation have been made to obtain the emergency safety device by providing circulation.

Q. The Johnston device circulates through the tester, does it not?

A. Yes.

Q. The Cox device does not circulate through the tester, does it?

A. No; it doesn't. While the packer is seated it would circulate above the packer but, in the event the packer was drawn off its seat and there was a need for the fluid in the well, the fluid would flow down around the packer, beneath the packer, and serve the same purposes as the circulating valve in the Johnston device.

Q. As a matter of fact, the Cox apparatus includes this pipe No. 1 so that you can maintain circulation during the time that the packer is seated and the test is being received into the tube 13, does it not?

A. Yes.

Q. There is no such provision in the Johnston device, is there?

A. No; not for maintaining circulation while you are seated.

Q. Any circulation that you could have in the Johnston device would have to correspond to a circulation down the test tube 13 in the Cox patent, would it not?

A. Yes; that is, so far as drawing a distinction between circulation above the packer and through the packer. The Johnston device circulates through the packer and this circulates either above it or around it.

[fol. 450] Q. The Johnston device contains no provision for circulating and also at the same time recovering a test, isn't that right?

A. That is right.

Q. Whereas Cox does? That is also true, isn't it?

A. Yes. The circulation in Cox is entirely independent of any testing operation.

Q. Do you mean by independent that both can go on at the same time?

A. Both can go on at the same time or either could go on without the other.

Q. Cox doesn't make any reference to the latter, does he, in his patent, that is, doesn't disclose any teaching of eliminating one and using the other?

A. No. Cox intended that he should maintain circulation when his packer was seated.

Q. In your search and investigation of the prior art was any attempt made to determine whether this Cox device was ever successfully used commercially?

A. Yes; attempts were made, and the information obtained did not seem sufficiently satisfactory as proof to bring it into court.

Q. You can't find any satisfactory proof, or haven't been able to find any satisfactory proof to show that this Cox device is being used commercially in the oil fields?

Mr. Boyken: We object to that, your Honor. This witness has been limited in his direct examination to testifying as to the operation of these devices of the patents. We don't contend that he has any general knowledge of the oil fields. In fact Mr. Lyon objected to our asking him questions regarding the practical operation of these tools. I think, therefore, that it is not proper cross-examination to [fol. 451] ask him now whether any of these devices actually had any commercial activity in the oil fields.

Mr. L. S. Lyon: I am not asking him for his opinion as to whether this is practical or not. He testified that he had charge of the investigation to prepare any available defenses for this case, and he testified in regard to this patent and what could be done with it, he thinks, and I am asking him if, in the course of his investigation, he tried to find out whether this thing had ever been used commercially, or is being used. He says he tried to find out, and I want to show that they were unable to find any such thing. That has got nothing at all to do with asking him for his opinion about whether this is a practical device or not.

Mr. Boyken: His search was confined to a search in the patents and the literature, and not in the oil fields, to find out whether use was made of these devices. Furthermore, the matter is immaterial. It does not make any difference whether these devices of the earlier patents were ever used or not. We are using them merely as prior publications,

and it is utterly immaterial in this case whether Mr. Cox or anyone else ever made a device of this kind. I therefore object to it as not proper cross-examination, and, second, as immaterial.

The Court: To ask him if he has knowledge as to whether this device was used to any great extent, would not that of necessity require practical knowledge of what was going on in the oil fields? Otherwise it would be more or less hearsay evidence, it seems to me.

Mr. L. S. Lyon: Your Honor, he testified already that he had had charge of preparing this prior art defense, and that he has made an investigation. I haven't asked him how [fol. 452] good this thing was, if it was used. I have asked him if he could find out that it was ever being used or had ever been used at all. He said he investigated to find out.

The Court: Objection sustained.

Mr. L. S. Lyon: An exception.

Q. Now will you turn to the patent to Edwards?

The Court: What number is that?

Mr. L. S. Lyon: That is Defendants' Exhibit H-16, your Honor.

The Court: Do you have the number of the patent?

The Witness: No. 1,514,585.

The Court: That is the Edwards patent?

Mr. L. S. Lyon: Yes, your Honor.

By Mr. L. S. Lyon:

Q. This patent was cited and considered by the Patent Office examiners and the Board of Appeals on the grant of the Simmons patent, was it not?

A. Yes; it was considered by the Examiner on several occasions; quite a number of claims——

Q. I am not asking you to tell us what he did. The record speaks for itself.

A. I thought you asked me if the examiner considered it.

Q. This is the patent that was cited by the examiner, one of the patents that was cited by the examiner during the consideration of the Simmons application, was it?

A. Yes; and on the basis of which quite a few claims were cancelled.

[fol. 453] Q. And so also was the Cox patent, the Cooper patent and the Franklin patent; isn't that true?

A. The Franklin patent was never cited by the examiner during the prosecution of the Simmons case, as I recall. It came up on motion to dissolve.

Q. But it was considered by the Board of Appeals?

A. It was considered by the Board of Appeals on a motion to dissolve.

Q. And the Cooper and Cox patents were cited, considered by the Patent Office also?

A. Yes.

Q. This is the patent that suit that counsel has called the Court's attention to, decided by Judge Hutcheson, Edwards against the Johnston Formation Testing Company, was based on, isn't it?

A. Yes.

Q. And this patent was discussed by you before Judge Bryant, and was Exhibit 28 in that case; is that correct?

A. I don't recall the exhibit number. I discussed the patent.

Q. I believe you stated that if you had been asked to suggest what was the best thing to use for testing a well that existed in the known art immediately prior to the Simmons invention, say the question had been asked you in 1924, that you would select this Edwards patent; is that correct?

A. That is.

The Court: The Edwards patent?

Mr. L. S. Lyon: Yes, this Edwards patent.

By Mr. L. B. Lyon:

Q. This Edwards patent discloses recovering the natural fluids from a formation to be tested solely by their flowing [fol. 454] through the test tube to the top of the well or by pumping them out, and makes no reference to entrapping a sample in the bottom of the test string and lifting the entrapped sample out to examine it; is that correct?

A. It makes no reference——

Q. Can't you answer that yes or no?

A. I can't answer it yes or no.

Q. Give us the best answer you can.

A. It makes no reference to definitely entrapping the sample. But there is a disclaimer over on page 3 that Mr. Edwards made after the patent had issued.

Q. Well, that——

Mr. Boyken: Just a minute, please.

Mr. L. S. Lyon: I object to the disclaimer. That was filed in April, 1932, your Honor, and is a self-serving declaration by Mr. Edwards. It wasn't part of the disclosure of this patent as it existed prior to the Simmons invention.

Mr. Boyken: The disclaimer becomes a part of the patent, your Honor. It is just as much self-serving as the application itself.

Mr. L. S. Lyon: You can't contend that a disclaimer filed in 1932 was part of the published information in this patent prior to 1926.

The Court: Let the witness answer the question.

A. The disclaimer states——

Mr. L. S. Lyon: I object to the reference to the disclaimer, as not part of the patent as it existed in the prior art, your Honor.

The Court: Objection overruled.

Mr. L. S. Lyon: An exception.

[fol. 455] A. The disclaimer states that Charles R. Edwards hereby enters this disclaimer, as follows: "He, said patentee, disclaims any interpretation of any of the claims 1 to 6, inclusive, in the patent, which does not restrict said claims to a device that is capable of closing the test stem to the entrance of fluid from the bore beneath the packer by motion of the stem while the packer is set." And in view of that statement I contend——

By Mr. L. S. Lyon:

Q. I would like to ask the witness to answer my question, which excludes this disclaimer. I think on cross-examination I have a right to ask my own questions.

The Court: Is this the question that he said he couldn't answer?

Mr. L. S. Lyon: He said he couldn't answer it yes or no.

The Court: You mean this is the question that he said he was not able to answer yes or no?

Mr. Boyken: Yes, your Honor.

The Court: Now he is making his explanation. So go ahead and finish up.

The Witness: Will you please read the——

The Court: You had just read the disclaimer.

The Witness: Yes.

The Court: Now go on from there.

A. And Mr. Lyon asked me, as I recall, whether or not there was anything shown in this patent that would indicate that you could entrap a sample and take it out, and I said that the statement of the explanation in the disclaimer indicated that they intended to close the test stem to the entrance of fluid from the bore beneath the packer by motion of the stem while the packer is set. And he also discussed in the [fol. 456] Edwards patent that the test stem you can withdraw from the structure, and therefore it is my contention that the Edwards patent shows that they intended to entrap a sample by manipulation of the test string while the packer was set, and to withdraw that test string from the well with such entrapped material as was within it.

Q. That disclaimer was not filed until April 5, 1932, was it?

A. March 8, 1932.

Q. Is there any statement in the patent as it existed prior to the filing of the application by Simmons to cover his invention, wherein Edwards specifies that he is going to recover an entrapped sample?

A. No. And then the last paragraph—the Edwards patent is a very short patent, and the explanation is very sketchy—but in the last paragraph on page 1 he says: "To withdraw the apparatus the packer is first released before stopping the slush pump and the test stem is then withdrawn before withdrawing the drill pipe and packer." And why withdraw the test string from the well? I don't know of any other reason that he withdrew it than to remove such material as it contained.

Q. The whole idea in this Edwards patent is flowing out through the tube, isn't that correct?

A. The——

Q. Just answer that yes or no, if you can, and if you can't answer it yes or no, I will ask you, if I want you to give some other answer.

A. No, I don't contend it is.

Q. I call your attention to your testimony before Judge Bryant, at page 719 of the Texas record, and ask you if you [fol. 457] testified as follows with reference to the Edwards patent:

"Q. —The whole idea is flowing it out through the tube?
"A. —That is the whole disclosure, as far as description goes, yes, sir."

Did you so testify?

A. I so testified, and I expected you to ask that question. This disclaimer was something that I had not read then.

Q. I will ask that, in answering my questions on cross-examination from now on, that you disregard anything that is contained in that disclaimer and keep only to what the patent stated as it was printed and existd prior to the application for the Simmons patent. With that in mind, what is your answer?

A. With that in mind, my answer would be that Edwards discloses flowing or pumping.

Q. And does not disclose lifting an entrapped sample out?

A. ~~If I must~~ disregard the disclaimer and the last paragraph.

Q. Never mind. You can consider the last paragraph, but disregard the disclaimer. What is your answer?

A. My answer is as I gave it in Texas, that it was either by flowing by the pressure of the well or by pumping.

Q. Referring to pumping the sample out of the well or the test tube, if it didn't flow itself to the top of the well, what did Mr. Edwards have in mind, do you know, or can you tell us from this patent?

A. Yes. He states that if the pressure of the oil or other fluid should not be great, the pump in the working barrel can [fol. 453] be started and the fluid forced out through the stem 8, thus completely testing the stratum under investigation.

Q. In order to do that, if you were working on, say, a wildcat well, and wanted to make a test, where you couldn't get a flow to the top of the well, you would have to bring pumping equipment out to the well, would you not?

A. You would unless you entrapped a sample.

Q. The only way he tells you to do it is to pump it out; that is correct, isn't it?

A. In that paragraph: But in this disclaimer——

Mr. L. S. Lyon: Never mind. I will ask the court to instruct the witness, for my cross-examination, to disregard the disclaimer.

The Court: Yes.

The Witness: Very well.

By Mr. L. S. Lyon:

Q. I believe you testified before Judge Bryant, but I have forgotten the figures. How much do you think it would cost to take out equipment to a wildcat well so that you could pump out one of these samples, if it didn't flow to the top of the well?

A. Well, if you took a complete pumping equipment out there it would cost considerable.

Q. How much?

A. I don't think I would know the price.

Q. I think you testified something about it. Would $2500 be a fair estimate of what it would cost to get pumping equipment out to a well to pump out the sample?

A. It might be, if you couldn't use the equipment you have at the well, the sucker rods.

[fol. 459] Q. Well, you know very well that you don't have sucker rods on a wildcat well while it is being drilled, don't you?

A. No, you wouldn't.

Q. You wouldn't have any equipment that you could pump the well with before you had found production, would you, ordinarily?

A. No, not ordinarily. You have bailing equipment.

The Court: Do you indicate that $2500 is a reasonable sum? If not, what would you indicate as a reasonable sum?

A. I should indicate that as a reasonable sum.

By Mr. L. S. Lyon:

Q. And the price charged by Johnston for making one of the tests with his tool is only $300, isn't it?

A. Approximately.

Q. This Edwards device is also a two-string tester, is it not?

A. Yes, that is, carrying the same distinction we did before, that the outer string of pipe is for maintaining circulation when the packer is set, and that the inner string is the tube within which the sample material, and through which the sample material, is entrapped.

The Court: What is the necessity for maintaining the circulation?

A. The necessity was, when this packer was set in the hole, they were afraid that debris would fall in around

the top of it, causing it to stick, and for that reason they circulated fluid down through those openings 10, and up within the hole, and carried out such debris, as an insurance against the sticking of the pipe after it had been set. [fol. 460] The Court: Well, would that fluid fill the hole all the way up?

A. Yes. It fills it all the way up and circulates, and then they bring it down again, the same as they do with drilling. It overflows the top.

The Court; What was the necessity of having the outer tube, if the hole was filled with fluid anyhow?

A. They thought the necessity for having the outer tube was as a precautionary measure to prevent any crumbling of the wall down over the packer, that that circulation fluid would carry that material up and out of the well and not let it accumulate to such an extent as to stick the packer in the hole.

Q. Now referring to this Edwards patent, the tube that the fluid flows through from the formation is No. 8, is it not?

A. Yes.

Q. That constitutes the test tube?

A. That is the test tube.

Q. And the outer pipe that is used for maintaining circulation is No. 1; is that correct?

A. Yes.

Q. Now, while the device is being lowered into the well tube 8 at its lower end, that is, the perforated end, is pulled up and screwed into a nipple, No. 7; is that correct?

A. Either that or the sleeve or the nipple No. 7 is shoved down to the end and screwed on before the pipe is inserted into the well.

[fol. 461] Q. Do you understand that they lower these two strings 8 and 1 simultaneously or separately in putting this Edwards apparatus into the well?

A. According to Mr. Edwards, they lower them separately.

Q. That is what the patent says?

A. That is what the patent says.

Q. Which one is put in first?

A. The pipe 1 with the packer.

Q. And then the test tube 8 was put into the well, and it carried this nipple No. 7?

A. It carried the nipple No. 7, which acted as a sleeve to co-operate with the perforated end of the pipe 8 in form-

ing a valve, and also had a tapered shoulder which sat at the member 4, to form a seal-off at that point between the fluid above the packer and the formation below.

Q. When they got to the bottom of the well how would they open this test string at the bottom so that fluid could flow into these perforations?

A. The sleeve 7 was forced downwardly on the tapered seat 6, and that would frictionally hold the sleeve so that the pipe 8 could be rotated to unscrew the threads.

The Court: Wait a moment. I want to find these.

The Witness: 8 is the central tube. So that the pipe 8 could be rotated to unscrew the threaded connection between that head portion at its lower end and the sleeve 7, after which the pipe 8 was lowered, as shown in Figure 2, to project the perforated section of the pipe 8 into the area to be tested.

[fol. 462] Q. What does the Edwards patent state or describe as to in what order these things should be done to get this stuff out of the well?

A. The last paragraph, I believe, describes that.

Q. Is that the only description?

A. If there is any other description I would be pleased to admit it, if you would point it out. But that states that to withdraw the apparatus the packer is first released before stopping the slush pump and the test stem is then withdrawn before withdrawing the drill pipe and packer.

Q. You release this packer before you start withdrawing the test string?

A. Before you start withdrawing the test string.

Q. Then you would release the packer while these perforations were still exposed to the fluid in the well?

A. There is nothing in the patent that says that.

Q. Does it say the contrary?

A. If I am permitted to look at the disclaimer——

Q. Never mind the disclaimer.

A. No, it doesn't say anything to the contrary.

Q. How about this statement in the last paragraph of the patent, lines 105 to 110, which says: "To withdraw the apparatus the packer is first released before stopping the slush pump and the test stem is then withdrawn before withdrawing the drill pipe and packer"? Isn't that a clear statement that you don't begin withdrawing the test stem until after you have released the packer?

A. That wasn't what you asked me.
[fol. 463] Q. Well, I will ask you that now.
A. Yes. That is what I said before. But you asked me if there was anything there to indicate whether or not that test stem was closed.
Q. The only way you can close that test stem is by elevating on it from the top of the well; is that right?
A. It doesn't say withdrawing it from the packer.
Q. The only way you could close those perforations, if they could be closed at all, would be by pulling up on the test string; isn't that right?
A. Pulling up on the test string while the sleeve remains stationary within the packer.

The Court: Is the sleeve fixed to No. 1?
A. No. The sleeve is fixed to No. 8, and is frictionally held in the portion indicated at 4, the body member that is mounted on the——

By Mr. L. S. Lyon:

Q. You can't lift up on that string 8 except by pulling on it from the top of the well, can you?
A. No.
Q. And you can't cover up those holes in the bottom of string 8 except by lifting up on string 8 from the top of the well, can you?
A. No.
Q. Is there any statement in the Edwards patent that that is done before the packer is released?

The Court: That what is done?

By Mr. L. S. Lyon:

Q. That you lift up on this string 8 to close those holes before you release the packer?
A. No.

The Court: The contrary is so, is it not?
[fol. 464] Mr. L. S. Lyon: I think so, but he doesn't seem to think so.
The Court: "To withdraw the apparatus the packer is first released before stopping the slush pump and the test stem is then withdrawn."
The Witness: His sentence is, "To withdraw the appa-

ratus from the well." The first thing he withdraws is his test string from the well.

The Court: Very well.

By Mr. L. S. Lyon:

Q. In order to prevent the mud fluid from flowing into the test string 8 while the test string 8 is being pulled out of the well, it would be necessary to seal off or cover up these perforations tight enough so that mud fluid under pressure couldn't get into them; isn't that right?

A. That is correct.

Q. Does this Edwards patent state how to do that?

A. No, not if I am confined solely to the patent and am to ignore the disclaimer.

Q. It would be necessary, at least, to pull the pipe upward through the nipple 7 until the nipple covered the holes, would it not?

A. It would be——

Q. Is there any statement in the Edwards patent to the effect that you can pull this test string 8 up so that the perforations are covered by the nipple 7 on going out of the hole?

A. No, not in the patent specification as the patent was issued.

Q. The nipple 7 is not in any way tied or connected to the part 6 in which it is seated, is it?

A. No. It is just frictionally seated there and holds.

[fol. 465] Q. You mean it is just resting in it?

A. It is more than resting in it. If it was just resting there rotation of the tube 8 would produce rotation of it. It must be in there with sufficient force to be held against rotation when you screw or unscrew.

Q. But that is the only force? It is just set down in there?

A. Yes, it is set down in there; but your attention is called to the fact that there is a shoulder on the pipe 8 just above it, so that you can get some pressure on it to forcibly seat it.

Q. Is there any statement in the patent that when you lift up on the string 8 that nipple 7 won't come out along with the pipe 8 rather than remain in the seat 6 until you can pull the perforations up into the nipple 7?

A. No, there is no statement in the patent, ignoring the disclaimer.

Q. Would pulling these perforations up into the nipple 7 seal them off tight enough to prevent the mud fluid from

penetrating under pressure, or would it be necessary, if you know, to be able to screw this end of the string 8 back into the threads of the nipple 7?

A. I can answer that in two ways, one that I think the patent shows and one that Mr. Edwards told me.

Q. I don't care anything about what Mr. Edwards told you. That is not competent.

A. From a study of the patent it was my conclusion that it was intended to screw that pipe in at the lower end in order to seal it off.

Q. You know that cannot be done, don't you?

A. No; I don't.

[fol. 466] Q. In order to get that pipe to screw back into that nipple you would have to pull up on it from the top of the well, wouldn't you?

A. To some extent, but then you are working a thread into a sleeve.

Q. And that thread on the bottom of the pipe 8 is covered with fluid or mud because the packer has been released, hasn't it?

A. It might be.

Q. And you would have to lift up on the pipe and put some strain on the pipe in order to get that thread to start back in and screw up into the nipple, wouldn't you?

A. That would be pure speculation on my part.

The Court: My Lyon, what is the importance of that if the patent does not require that the end be screwed back where it was to begin with?

Mr. L. S. Lyon: I am bringing out, your Honor, and the Patent Office has held, that not only did Edwards have no idea of recovering an entrapped sample with this device, as evidenced by his reference to pumping, but that, as a matter of fact, he couldn't have unscrewed one with this device because, after you once unscrew this thing and open up those holes, you couldn't get it back into the nipple 7 tight enough to keep drilling fluid out because this nipple 7 would pull off of its seat and the whole thing would go up out of the well. You couldn't get enough strain on it to do it without unseating the nipple 7. That is what has been held.

The Court: As the pipe that precedes the sample is being lowered it is in the position shown in Figure 1, isn't it?

Mr. L. S. Lyon: That is right.

[fol. 467] The Court: Then, they have to unscrew it?

Mr. L. S. Lyon: Yes, and let it down.

The Court: And lower it still further, having unscrewed it?

Mr. L. S. Lyon: Into the position shown in Figure 2.

The Court: That is, into the chamber area where they get th matter to be tested?

Mr. L. S. Lyon: That is right. Now, the question is, your Honor, could Edwards have taken an entrapped sample with this device. He has got to be able to close it at the bottom in order to take it out. He doesn't say that he can and he doesn't say that he wants to. And we say that he couldn't have if he had thought of Simmons' idea; that, if he had thought of the same thing that occurred to Simmons, still, he couldn't have done it with this device.

The Court: By withdrawing that, drawing it up into the sleeve 7 again, the same as it was before, and taking it out, and if in that position the fluid from the pipe couldn't contaminate it, then he could——

Mr. L. S. Lyon: The point is he couldn't get it up there because he has got to work this thing from the top of the well and he has got to pull this pipe up without this nipple 7 coming up. It has got to stay there in its seat, and it is only resting there on that seat. And we say that he couldn't get that pipe to come up through that nipple; that the nipple would come right up with the pipe.

The Court: Why couldn't he?

Mr. L. S. Lyon: Because there would be mud and all the rest of it on the bottom end of this pipe. There is nothing to hold the nipple 7 down in that seat; and when you pull up [fol. 468] from the top of the well you are not going to be able to pull this into the nipple 7.

The Court: Do you mean the enlarged part at the lower end?

Mr. L. S. Lyon: Yes.. You can't pull it up so you can close these perforations.

The Court: Do you mean you cannot pull it through because that lower part is larger than the nipple 7?

Mr. L. S. Lyon: No. I mean when you pull on this thing from the top of the well——

The Court: That being No. 8?

Mr. L. S. Lyon: No. 8—in order to close this thing you would have to be able to pull this pipe up without this part 7 moving up. That would have to stay there until the pipe had pulled up to a point where it is shown in Figure 1.

The Court: And the pipe in the position that it is in Figure 1——

Mr. L. S. Lyon: We say you can't get it in there after it has once been opened. But, if you got it in that position, you shut it off all right if you get it screwed back in there.

The Court: Then, you would pull it up with the sleeve, too?

Mr. L. S. Lyon: Yes. But, in order to get it there, you have got to be able to pull this pipe up and screw it back without that sleeve 7 moving up. That is the point that I am making and the witness, I believe, has stated that he doesn't know what would happen.

A. No.

[fol. 469] Q. The patent doesn't state what would happen, does it?

A. No, if you ignore that disclaimer.

Q. You have referred to the fact that both Edwards and Cox thought it was necessary to have this second string of pipe to maintain this circulation while the packer was set. One advantage of the Johnston tool and of the Simmons tool is that your test string can be your regular drill pipe, isn't that correct; that you can use your regular drill pipe in a well for your test string because there is plenty of room for the drill pipe to go down the hole because that is the pipe that the well is being drilled with?

A. Yes; that is true, although I am not competent to say as to the selection of the drill pipe to the exclusion of any other pipe.

The Court: The question is is that one of the advantages of the Simmons and Johnston devices. Is it or isn't it?

A. I don't know.

By Mr. L. S. Lyon:

Q. But you know it is the practice to use the regular drilling pipe as the test string in both the Johnston and the Halliburton testers, don't you?

A. Yes.

Q. With the Edwards and the Cox devices you have got two different sized pipes to put into the same well. What sizes would they have to be? Do you know?

A. No. I wouldn't know.

Q. Ordinarily, the wells already have casing in them, do they not?

A. Yes; ordinarily.

[fol. 470] Q. There is some limit to the amount of room there is between a drill pipe and a casing in one of those wells, is there not?

A. Yes; there is some limit. But you are inquiring as to matters that are beyond my qualifications.

Q. You wouldn't know, then, if you had to run the Edwards or the Cox device, what kind of pipes to use so that you could have both the outer pipes which you have called for and the inner pipes, is that correct?

A. As I recall, either one or two of those patents says they use drill pipe.

Q. For which pipe? The outside or the inside?

A. Edwards says the numeral 1 refers to a pipe, usually ordinary drill stem, which is let down into the bore as drilling progresses.

Q. Then, the test tube in both the Edwards and the Cox devices would have to be a very much smaller pipe than the pipe which is used as the test tube in the Johnston and Simmons devices, isn't that correct?

A. It would have to be a pipe that would fit within a drill pipe.

Q. You have stated, Mr. Abbett, that the outer pipe in the Edwards and Cox patents would be drill pipe?

A. Edwards says that the outer pipe is a drill pipe.

Q. And Cox doesn't say?

A. I want to look at that patent again.

Q. If he does say it, we can find it ourselves.

A. Yes. It states that "1 denotes a section of drill stem with the usual couplings."

Q. Then, in both cases the outer pipe is a drill pipe, that is, in Edwards and Cox?

A. It is a drill pipe.

[fol. 471] Q. How big a hole is there through a drill pipe? Do you know?

A. No. I wouldn' know those dimensions.

Q. Do you know approximately how big it is?

A. No. I have never measured to find out.

Q. You know that these inner pipes would have to be very small, don't you?

A. The only thing I can say with any certainty is it would have to be small enough to go within the opening of the drill pipe. I have seen drill pipe but I have never had any occasion to measure the size.

Q. Then, as far as you know, it would be necessary to manufacture a special string of this smaller pipe to run through the drill pipe to operate the Edwards or the Cox testers, is that correct?

A. No; I don't know that it would be necessary to manufacture a special string. It would have to be made separately from the drill string but——

Q. Do you know of any?

Mr. Boyken: Let him finish his answer.

Mr. L. S. Lyon: He is not answering my question. He says he doesn't know and then he argues about it.

The Court: There is nothing before the court. Proceed with the questions.

By Mr. L. S. Lyon:

Q. You don't know of any pipe being used in oil wells and being present in oil wells of a small enough size to stick down drill pipe to the bottom of the well, do you?

A. I know of pipe that is small enough to stick down drill pipe.

Q. Will you refer to the Cooper patent——

The Court: What number is that?

[fol. 472] Mr. L. S. Lyon: That is Defendants' Exhibit No. H-12 and is patent No. 1,000,583 to A. S. Cooper.

Q. You explained this patent to Judge Bryant in your testimony in the Texas case, and in that case it was Exhibit No. 24, is that correct?

A. I explained it to him.

Q. Well, how many pipes and how many rods are embodied in this Cooper device that Cooper had to put down the hole and get out of the hole?

A. We have one pipe, which is No. 2, and on which is carried a packer——

The Court: It is numbered what?

A. 2, and on which is carried the packer 3. That packer is an inflatable packer and there is a pipe which conducts liquid into the packer.

By Mr. L. S. Lyon:

Q. What pipe is that?

A. Pipe 8. Then associated with the packer at the lower end of the structure are rods that slide and are operated by

the two ropes 11 and 20, ropes or cables, from the top of the well to control the packer valve 13 or to control the valve at the bottom of the test string 2 as generally indicated at 25. There is one main pipe, a small pipe 8, which is associated with the packer, and then the rods which are connected with the operating strings 11 and 20 and are mounted on the structure at the lower end of the pipe 2.

Q. Then, to operate this Cooper device you would have to put down a well a pipe corresponding to No. 2?

The Court: Wait a minute, Mr. Lyon, until I find that.

Mr. L. S. Lyon: No. 2 is at the top of Figure 1 on the righthand side.

[fol. 473] The Court: Does that represent the pipe?

Mr. L. S. Lyon: No. 2 has a lead line that runs over to the pipe, I think, at the top of Figure 1, right at the right of the pipe.

The Court: Figure 2 appears in three places but I am not able to tell just what it means. The lower one down towards the bottom would indicate a pipe at that point, would it?

Mr. L. S. Lyon: It refers to the same pipe in all three places. Doesn't it?

A. The numeral 2 refers to the same pipe in all three places. They have the numeral 2 there and a 2 here. In other words, that is continuous pipe the entire structure.

By Mr. L. S. Lyon:

Q. What are these things down here, Nos. 19 and 14?

A. Those are part of the packer and valve assembly which is on the lower end of this pipe 2 and, specifically, 19 is a member slideably vertically to operate the valve 25, and 14 is a member associated with the packer to control the relief of fluid from the packer when desired.

Q. Let's see. You have got the pipe 2, the packer 3 and this feed pipe No. 8——

A. That is the only other pipe on it and it is part of the packer assembly. It runs clear to the top of the well and comes down and brings fluid for the inflatable packer.

Q. And, also, you have got these rods 10 and 19. How far do they run?

A. They run to such a point as you see. They don't run clear to the top of the well. The cables 11 and 20 extend to the top of the well.

[fol. 474] Q. Then, you have two pipes and two ropes running from the packer to the top of the well in this device, is that right?

A. Yes.

Q. What is this No. 36 over here?

A. That is another form of the invention when you want to pump material from below here. That is a structure which has even been shown in those old Three Well patents, where you lower a pumping structure down and can take it out or put it in at will.

Q. Isn't Figure 2 supposed to be used in Figure 1? It is not a different form, is it, from Figure 1? It is just another part shown there, isn't it?

A. As far as the main structure is concerned it is substantially the same but this says Figure 2 is a string or line of pipe extending down in the well—well, I was looking at the wrong place. Figure 2 is a detail showing a hole or opening in the flow pipe, which hole communicates with the well above the packer. It also shows a pump let into the flow pipe. It doesn't say it is always let into the flow pipe.

Q. It doesn't say that it sometimes isn't, does it? Is there any statement in this Cooper patent anywhere that you lower this stuff that is shown in Figure 1 into the well and use it without having the stuff shown in Figure 2?

A. Yes; I think so.

Q. Will you point it out?

A. It states over on page 2 that they can remove the fluid from the pipe 2 by bailing.

Q. Does this Cooper patent describe anywhere recovering an entrapped sample to be lifted out of the well for [fol. 475] examination by hoisting the pipe with the sample therein by a valve?

A. No; it does not state that, although the entire structure can be used for that purpose, the valve at the bottom being opened and closed by one of the cords at the top of the well.

Q. How do you know it can be used for that purpose? Did you ever try it?

A. No. But anybody would know, if you had a pipe and a valve on the lower end of it and opened it, that, if you closed it, you could withdraw the fluid entrapped within the pipe by the closing of the valve.

Q. What do they have to have the pump for, then, if they are going to pull out an entrapped sample?

A. It states here that in certain cases, when they want to thoroughly extract the fluid in the well, they use that pump. I didn't say in answer to your last question that the patent said that you entrap the sample. I said this structure was capable of entrapping it.

Q. And to do that you would have to use all of these ropes and the rods and this packer as well as the pipe, wouldn't you?

A. If you used that type of packer.

Q. Actually Cooper discloses only getting a sample from the formation by either bailing it out or by pumping it out, isn't that correct?

A. Yes; if I may define the term "bailing" and "pumping" by saying that he opens the valve at the bottom of the pipe 2 after he sets his packer to seal off an area, and that then, with that material in there, he either lowers a bailer through it or pumps it to draw that material out to get his sample.

[fol. 476] By the Court:

Q. Do you mean that he doesn't get it by lifting the pipe up?

A. He doesn't describe getting it by lifting the pipe up. And that is what I say, that this valve when closed would entrap such material as was in there and would be withdrawn with it.

Q. Is the pipe empty up to the time the valve is opened?

A. Yes; the pipe is empty.

By Mr. L. S. Lyon:

Q. What about the hole 31?

A. That hole 31 is one that shows one form of structure which we have given some consideration. In this particular form here, Fig. 3, it is shown with a check valve on it.

Q. If it hasn't got any valve in this hole 31, how could your answer to the Court's question be correct about this being an empty pipe?

A. He has shown here a structure used in pumping, and that hole may or may not have been used there. It is used here with a check valve.

Q. What is he showing in Figure 1?

A. He is showing a check valve. Referring to your question relative to Fig. 1, 31 is a lead line leading rather ob-

scurely to this side of the pipe and 32 is the check valve shown in it, and with that type of device he can entrap a sample.

Q. You say that is a check valve. Does it keep fluid from going out of the pipe or into the pipe?

A. He says he can use it either way, either to have a check of the fluid by which he keeps the fluid from coming out of the pipe, or he can reverse it so as to have it go into the pipe.

[fol. 477] Q. If he did that, then, he couldn't keep his pipe dry, could he?

A. He could keep his pipe dry if he had it so that the fluid would not go into the pipe.

Q. If he had it the other way, it would not?

A. No. But he shows a structure that is capable of maintaining the sample.

Q. If you had a check valve, the fluid from outside of the pipe would come in or the sample from inside of the pipe could go out, couldn't it, one or the other?

A. One or the other. But we have that same sort of a check valve for a circulating valve on the Johnston device right now and it only goes one way.

Q. You say it could go one way or the other?

A. No. It can go one way. A check valve doesn't permit fluid to go both ways.

By the Court:

Q. In any event, a check valve means that the valve is closed, doesn't it?

A. In one direction.

Q. Only in one direction? Then, when it has fluid on both sides, the fluid will go from one side to the other, will it not?

A. In the direction in which it is permitted to flow but not in the other direction.

By Mr. L. S. Lyon:

Q. The check valve in the Johnston device that you refer to is below the main valve, isn't it?

A. Yes. But it effects the passageway right through the main valve.

Q. That is what you called the circulating valve?

A. Yes. The fluid pressure is on the outside.

[fol. 478] Q. Have you decided how you would get all of this stuff that is shown in the Cooper patent down a well?

A. Do I have to decide that?

Q. Well, have you? If you haven't, why all right.

A. He states that he lowers that assembly down on the pipe to its position.

Q. You said down in Texas you didn't know how you would get it down a well. Do you know now?

A. I made the answer I am making right now, that he stated down there that he lowered that assembly down in the pipe to that position.

Q. The whole business at once, do you think?

A. That packer assembly, I gather.

Q. Do you think he lowered the stuff with the pipe or do you think he put the pipe down and then this packer down the pipe?

A. No. I think that entire assembly, as shown there in Figure 1, must have been lowered as a unit on the lower end of the pipe.

Q. Do you find any statement to that effect in the Cooper patent?

A. I thought so.

Q. Well, point it out if you can find it. As a matter of fact, that packer is not carried on the pipe at all? It is carried on those rods that are controlled by those ropes, isn't that correct?

A. It is mounted on sleeves there; yes.

Q. Just answer the question. It is not carried on the pipe? It is carried on those rods, isn't it?

A. Well, I can't answer the question that way.

Q. Is it carried on the pipe or is it carried on the rods?

A. It is mounted on the pipe.

[fol. 479] Q. Where do you find that statement in the patent?

A. You can see that from looking at Figure 1, that it is mounted on the pipe.

Q. It looks to me like it was mounted on the rods.

A. The rods are connected with it, I will admit, but it certainly is on the pipe.

Q. Is there any connection between the rods and the pipe? Look at line 25, page 2, Mr. Abbett.

A. That is the part I was trying to find.

Q. It says that the packer is lowered into the well by the rod 10, doesn't it?

A. It does.

Q. Not by the pipe?

A. No; I didn't say it was lowered by the pipe. I said that structure was mounted on the pipe and the pipe extends through it.

Q. I am talking about when it is being put into the well. Do you stick this packer onto the pipe and hold onto the pipe to lower the packer or do you lower the packer by operation of lowering the rod 10?

A. It is supported by the rod 10 as it is lowered.

Q. Then, how are you going to do that, do you know, in an oil well?

A. I think that that entire structure is strung over the pipe 2 and supported by the rod 10 and progressively lowered into the well as the pipe 2 is assembled and lowered.

Q. Could there be any mud fluid in this well that Cooper intended to use this device on?

A. There might be.

Q. Is this a drilling well that he is referring to?

A. Yes; I think it is.

[fol. 480] Q. Does he say so? If so, where? He calls it a device for operating a well, not for drilling one, doesn't he?

A. He also says the structure is to be used in testing for the presence of oil, gas and water. And I, therefore, assume the well wasn't finished.

Q. Does he say it wasn't finished?

A. He doesn't show it finished.

Q. Does he say there was any drilling mud in this well anywhere in the patent?

A. No; he doesn't say that there is drilling mud in the well.

Q. What does he say he is running this in for? What is he trying to find?

A. He says, on page 2, line 119, "By this method of procedure a well can be tested for the presence of oil or gas, by pumping, which could not be done if a flood of surface water were entering the well which the pump or bailer was incapable of removing."

Q. Do you understand that that means that while the well is being drilled he is trying to find out what natural fluids have been exposed in the drilling of the well?

A. That is what I understand from the term "tested."

Q. You don't know that the term "tested" can be used for any other purpose in the oil well drilling art?

A. None other than to obtain a test.

Q. In the kind of a test that you have referred to, that is, a test made when you are drilling an oil well, if you want to find out what natural fluids you may have opened up but which are concealed by the pressure of the drilling [fol. 481] mud, is that the only use of the term "test" in the oil drilling art that you know of?

A. Why, no. A test applies to anything a person might do. But this man says he is testing for the presence of oil or gas.

Q. Doesn't he say in line 46 what he means by that, on page 2, "I will now describe the uses of the device. There is, what I may term, continual warfare between natural gas and the liquids (oil and water) for the possession of a well"? He is not talking about any problem of trying to detect what natural fluids he has encountered or opened up in drilling a well, that are being shut off by pressure of the rotary mud? He is talking about something else there, isn't he?

A. No; he is not.

Q. Well, read what he says. He is not talking about drilling mud preventing his knowing what these fluids are, is he?

A. No. But he says there are water courses and water in that well and there is oil and gas, and they are continuously in warfare, and he wants to shut off the water from those other materials which are at the bottom of the well so that they will not be influenced or overcome by his water pressure or liquid pressure.

Q. Isn't it clear from his patent that he puts this device down a well that he knows will produce oil and gas?

A. No; it is not clear to me because he says that he can use this device to test for the presence of oil and gas.

Q. What does this statement mean in line 57, "They will stifle or drown out the gas and no more can be had, and the well, if then operated for oil, will be ultimately exhausted, [fol. 482] leaving the water in possession"? What does that mean?

A. It means just what it says there, that those superior pressures of other liquids in the well might choke or drown the oil or gas so that, if then operated for oil, the well will be ultimately exhausted. It doesn't say they were going to but, if it was then operated, it would be ultimately exhausted. As a matter of fact, from the personal contact I have had——

Q. Will you point to any statement in the Cooper patent to the effect that he is going to use his device for testing purposes during the drilling of an oil well to find out if he has uncovered any oil or gas or water that is being held back by the pressure of the mud fluid?

A. Does the qualification "mud fluid" have to go into that answer?

Q. Drilling fluid; yes.

A. No; he doesn't limit it to any kind——

Q. I didn't ask you that. He does not disclose doing that, does he?

A. He says this device is for the purpose of testing a well for oil or gas.

Q. All right. Point to the statement where he tells you that you can use this apparatus during the drilling of a well to get samples of fluids that have been uncovered by the drilling of the well but which are concealed from him at the top of the well by the pressure of the mud fluid.

A. There is no mention of mud fluid. But your question is compound. You are putting a number of factors in it and all I can do is to stand on his own statement. As I said before, he says, "By this method of procedure a well can be [fol. 483] tested for the presence of oil or gas." Whether he is drilling a well or not, he says he is testing it to find whether that material is there.

Q. Where is the statement that you have just quoted from?

A. That is on page 2 at line 115.

Q. In line 115 it says that the way you can make that test is by pumping, isn't that correct?

A. Yes. That is a further part of the sentence, "by pumping, which could not be done if a flood of surface water were entering the well which the pump or bailer was incapable of removing."

Q. Can surface water enter a well that is full of mud fluid or drilling fluid?

A. In certain cases; yes.

Q. In what cases?

A. In cases where the head of the surface water is greater than the weight of the drilling fluid. I personally was at a well the other day in which they were carrying 450 pounds of pressure in the hole to hold back the surface water which was crowding into the hole during drilling.

Q. Would the surface water chase the mud fluid out of the well?

A. It would take possession of the well.

Q. Well, if there is mud fluid in a well, can surface water enter a well?

A. Yes; if the pressure of the surface water is superior to that of the mud fluid.

[fol. 484] Q. Do you know of cases where the pressure of surface water is greater than the pressure that is exerted by drilling fluid, when a well is full of drilling fluid?

A. Yes. I can take you to a well where they are fishing now for the tools, that he surface water has entered, where the well caved in ..der the action of the surface water and they are fishin, for the tools now.

Q. Is that the kind of a situation that you think Cooper is referring to in this patent?

A. It is an extreme degree of that situation; yes.

Q. The kind that he is referring to?

A. Yes. He has water pressure in the well and he wants to exclude that water pressure, the column of water pressure, from the area in which he is making the test.

Mr. L. S. Lyon: If your Honor please, at the adjournment we were discussing the Cooper patent, Exhibit H-12, and I have some further questions on that patent.

The Court: What is the number of that patent?

Mr. L. S. Lyon: It is No. 1,000,583.

Q. Referring, now, to the hole 31 that we were discussing yesterday, shown in Figure 2 of the drawing, would it be possible to employ a device having such a hole and recover an entrapped sample? By an entrapped sample I mean a sample that is lifted from the well by lifting out the pipe.

A. You would not be able to recover any entrapped sample above that hole if it were open as shown in Figure 2. You might obtain the volume of fluid that would be below the hole within the pipe but with the form of device shown [fol. 485] in Figure 3 a sample could be obtained with the check valve 32 in place.

Q. Could you use such a check valve on one of the testers of the types employed by the defendants or plaintiffs in this case and operate the devices for the purposes intended?

A. Yes. You could use the check valve with the type called the circulating valve in defendant's device, which

would exclude fluid from the exterior, in place of the member 32 shown in the Cooper patent.

Q. Is that check valve numbered 32 that you are now referring to in the Cooper patent?

A. Yes.

Q. In the case before Judge Bryant, and I am going to read from page 950 of the record, did you testify as follows:

"Q.—You could not have a check valve corresponding to that numbered 32 in this patent on one of the testers of the Halliburton or Johnston type, whether it was closed so that you could let fluid in or the opposite, fixed so it would let fluid out, could you?

"A.—No."

Did you so testify?

Mr. Morgan: Just a minute. Read the whole answer.

By Mr. L. S. Lyon:

Q. "But my understanding of this is that those members can be provided for certain classes of work." Did you so testify?

A. You correctly read my statement; yes. But in further considering the disclosure here, where it states that the valve could be made either to open——

[fol. 486] Mr. L. S. Lyon: I don't think there is any question of the answer, your Honor.

The Court: No. The witness may answer what he wants to.

A. But in a further study of the disclosure here, which states that the valve could be made either to open from the inside or the outside, it is evident to me that if it opened from the inside and excluded the fluid from the outside, that it could entrap a sample.

By Mr. L. S. Lyon:

Q. There is nothing said in the Cooper patent about the springs on the check valve 35 being strong enough to withstand the pressure of drilling fluid in a well, is there?

A. No. It just states that the valve could be opened either way.

Q. The packer in this Cooper device is not operated by movement of the pipe, is it?

A. You mean to set it?

Q. To set it or release it

A. No. It is operated by the control of fluid pressure.

Q. And the valve 25 in the Cooper patent is not operated by movement of the pipe, is it?

A. No, it is not operated by movement of the pipe. And in that connection one of the reasons that I have continued to consider Cooper is because certain of the claims of the Simmons patent, one particularly, does not specify the instrumentality by which that valve is moved.

Q. But the claims that do specify that the valve is operated by movement of the pipe are not met by the Cooper patent, is that correct, in terms?

A. Not in terms.

[fol. 487] Q. Do you understand the disclosure of this Cooper patent beginning at line 46 on page 2 and ending at line 121 on page 2, with reference to avoiding the gas dissolving in the oil or water that is in the well?

A. Well, I know what I think it means, but——

Q. The method described by Cooper is one in which all the fluid in the well is fluid that comes in from the formation, isn't it?

The Court: You say all the fluid in the well?

Mr. L. S. Lyon: Yes, the fluid——

The Court: There is no drilling fluid?

Mr. L. S. Lyon: No drilling fluid, and that the only fluid in the well is fluid that is produced by the well itself.

A. That is the only fluid that he discusses. Whether or not drilling fluid is present during the drilling of this well and might be here present I don't know, but the only fluid he discusses are those fluids that are native in the formation.

Q. What Cooper describes he wants to do is to get the gas to come to the top of the well, in addition to the water and oil; isn't that correct?

A. In one description of his invention.

Q. And for that purpose he bails the fluid out of the well above the packer; isn't that correct?

A. You mean within the well itself and around the tube?

Q. Yes.

A. And in the sealed-off area above the packer?

Q. Yes.

A. Well, I do not see that place, but I seem to recall that there was a statement of that sort in the patent, and if [fol. 488] you will point it out to me I will be glad to acknowledge it, if it——

Q. Perhaps I can refresh your recollection by reading your testimony before Judge Bryant, at page 967 of the record in that case.

A. I would appreciate it.

Q. "And what you are trying to do is to get the gas to come to the top of the well in addition to water and oil; isn't that correct?

"A.—Yes.

"Q.—And for that purpose he bails the fluid out of the well above the packer; isn't that correct?

"A.—Under some circumstances.

"Q.—Well, that is the method he describes, isn't it? Look at line 101 on page 2.

"A.—Yes. He says that under certain circumstances he bails out the pipe 2.

"Q.—He does not say under some circumstances, but he says when the gas is stifled by the water and oil?

"A.—Yes."

Did you testify that way before Judge Bryant?

A. I testified that way, but I don't understand that that answers the question because, if he bails out pipe 2, he is bailing out the test or sample chamber and is not bailing out the well above the packer.

Q. What does he describe doing in the sentence commencing at line 101 on page 2, reading, "When the gas is again stifled by the water or oil the valve 23 can be closed and the pipe 2 bailed out, and after an interval, governed by the known action of the gas and liquids in the [fol. 489] well, the valve 23 can be again opened and the operation will be repeated"?

A. He states very definitely that what he does is that he closes the valve at the bottom of pipe 2 and bails out the material that is within the pipe, and that after that is bailed out, when conditions are proper, he can open the valve at the bottom of pipe 2, allow material to go into

pipe 2 again and repeat the bailing operation if desired.

Q. In the following sentences in the paragraph he brings out that, if the pressure is not sufficient to cause the well to flow to the top, that he pumps out the well, does he not, or pumps out the pipe?

A. Yes; that he pumps out the pipe 2. But he does not say that he removes all the fluid that is above the packer and within the well.

Q. Then, the only method that he describes in his patent for removing fluid from below the packer is by pumping or bailing, isn't that correct?

A. After he has entrapped the fluid within the pipe 2. As we have just read, he states that before he pumps or bails he closes the bottom valve. That entraps the material within the pipe 2 and then he removes it.

Q. The only way he describes removing it is by either bailing it out or by pumping it out?

A. Yes; within the pipe and the entrapped sample there contained.

Q. If the hole 31 is open at that stage while he is bailing out the well, why he will also bail out whatever fluid there is behind the pipe, will he not?

A. If the hole 31 is open and unobstructed, his bailing operation eventually would bail the entire well. But that does not appear to be the principal idea in his patent.

[fol. 490] Q. That method is not excluded, is it?

A. No; that method is not excluded. But that wouldn't give the test which he says that he wants to make for the presence of oil or gas.

Q. What is hole 31 for?

A. Hole 31, as he has stated, if left open, will permit the water from the casing above the packer to be pumped out or bailed.

Q. Is there any statement in this Cooper patent about how you get the apparatus out of the well?

A. No; I don't recall a statement of either introducing the apparatus into the well or removing it.

Q. The patent does describe that you can take the packer out independent of the rest of the apparatus, does it not?

A. I don't recall that statement. It says it can be moved about to different points in the well to search for a place in the well where the surface water can be permanently shut off.

Q. I will again see if I can refresh your recollection by referring to your testimony before Judge Bryant, at page 970 of the record.

"Q.—Doesn't the patent describe that you can take the packer out entirely independent of the rest of the apparatus?

"A.—Yes. He states that."

Did you testify to that before Judge Bryant?

A. Is that the end of the sentence?

Q. Yes. I will show you the testimony if you want to see it.

A. No. If that is read from the testimony, I will say that I testified that way; yes.

[fol. 491] Q. Then, the packer is not fixed immovably to the pipe, is it, so that it can only move with the pipe?

A. No. It can be moved on the pipe, as I read a moment ago.

Q. You do not contend that any of the claims of the patent in suit read on this Cooper patent which are limited to operating the packer by movement of the pipe or operating the valve by movement of the pipe, do you?

A. If by "operation" you mean the direct operation of the packer to set it, it, of course, does not become opearted by any movement of the pipe because it is dilatable and is operated by a fluid.

Q. Can't you answer that last question yes or no?

A. No, for this reason, that, when the packer is on the pipe, it might be possible to bodily move the two together, if you mean that by operation, but, if you mean setting, the packer is not set by movement of the pipe.

Q. You do not contend that any of the claims of this patent of Simmons read on this Cooper patent which are limited to operating the packer by movement of the pipe or operating the valve by movement of the pipe, do you?

The Court: You should answer that by yes or no, it seems to me.

A. In answering yes or no can that question be divided into two parts?

The Court: If you can answer it, do so, and, if you can't answer it, say so.

A. No. The setting of the packer and the movement of the valve in the Cooper patent are both effected by means other than the movement of the pipe.

By Mr. L. S. Lyon:

Q. Will you refer to the patent to Lyon, No. 46,124, De- [fol. 492] fendants' Exhibit H-1? Do you contend that any of the apparatus or method claims of the patent in suit here read on the disclosures of this Lyons patent?

A. Considered as an anticipation?

Q. Just answer the question.

A. No.

Q. This Lyons patent contains no disclosure of recovering an entrapped sample, does it, and by an "entrapped sample" I mean, as I have always meant in my examination, a sample that you recover at the top of the well by lifting it out in the pipe.

A. No, it does not cover a sample lifted out within the pipe, but it shows the recovery of a sample from the pipe.

Q. How do you get the sample out of the Lyons patent?

A. It comes out under pressure, either the native pressure in the formation or an imposed pressure of the pipe lowering into the well.

Q. In other words, according to the Lyons patent, if the fluid will not flow under its own pressure to the top of the well, you blow it out with some kind of a gas pressure; isn't that correct?

A. That is correct.

Q. Please refer now to the Latham patent, No. 56,234, Defendants' Exhibit H-2. Do you contend that any of the claims of the patent in suit read on the disclosure of this Latham patent?

A. No.

Q. The Latham patent discloses only a packer; isn't that correct?

A. And that is why it was cited.

[fol. 493] Q. It does not disclose any method or apparatus for testing a well, does it?

A. No. It was concerned with a packer on a pumping outfit.

Q. Will you please now refer to the patent to Kewley, No. 58,837, Defendants' Exhibit H-3. Do you contend that any of the claims of the patent here in suit read on the disclosure of this Kewley patent?

A. No. It was cited to show that that type of packer was existent in 1866.

Q. Is your testimony the same in regard to the patent to Dower, No. 249,228, Defendants' Exhibit No. H-8?

A. Yes.

Q. I will ask you to look at Figure 1 of this Dower patent and refer to the port O. Does that disclose an equalizing valve for a packer corresponding to the equalizing valve which you have referred to in your direct examination as existing in the packer on the Johnston tool?

A. That discloses means whereby lifting on the pipe will permit fluid to flow through the packer structure.

Q. In other words, when you lift up on the packer you open up a valve, so that the pressure above the packer is equalized below the packer; isn't that correct?

A. It would when those ports are disclosed, or uncovered, probably would be a better word.

Q. That is the same operation that you have in the packer that you referred to in describing the Johnston tool, isn't it?

A. That is the same result.

[fol. 494] Q. Now, will you please refer to the patent to Burr & Wakelee, No. 68,350, Defendants' Exhibit H-4. This is a device for pumping a well, isn't it?

A. The title of the invention is "Improvement in apparatus for testing deep wells."

Q. But what he actually describes is a device for pumping a well; isn't that right?

A. Well, he obtains his test sample by pumping, yes.

Q. And the pump is at the top of the well, a suction pump; is that right?

A. The pump mechanism, at least, is at the top of the well.

Q. The only way he describes of getting any fluid out of the well is by pumping it from the top of the well by suction of the pump at the top of the well, isn't that right?

A. Yes; that is the way he describes.

Q. Do you know how far you can lift fluid, how many feet, by suction from a pump above the fluid?

A. Well, that question was asked me in Texas, and if you care to read that answer——

The Court: Does not the court take judicial notice of that? The court knows something about a suction pump. I understand that the distance is about 32 feet, with water.

Mr. L. S. Lyon: And I asked the witness that in Texas, and he didn't know.

A. I stated about 26, if I recall right. It is in the record there.

The Court: That is one of the laws, I am quite sure, that the court takes notice of.

[fol. 495] By Mr. L. S. Lyon:

Q. Well, you don't contend that this device shown in the Burr & Wakelee patent could be used for the purpose of the plaintiffs' and defendant's devices herein issue, do you?

A. The structure?

The Court: Just answer that question yes or no.

A. Yes.

By Mr. L. S. Lyon:

Q. You do?

A. Yes.

Q. You think you could, instead of using a Halliburton or a Johnston tester to test one of these deep wells, that you could use this pump described by Burr & Wakelee, at the top of the well, and pump up the sample, suck it up?

The Court: What patent number is that?

Mr. L. S. Lyon: No. 68,350, your Honor.

The Witness: It is one of the earlier ones.

The Court. Yes. I see.

The Witness: Now will you please read the question?

(Question read by the reporter.)

A. No, not if "suction pump" means a pump that would only lift 26 to 30 feet, but he says it is a device for testing deep wells, and he certainly must have meant something more than a 30-foot hole.

Q. No matter what he said in 1867, this gentleman from Battle Creek, Michigan, is the apparatus that he describes there, that pump at the top of the well, capable of pumping a sample out of a deep well, an oil well several thousand feet deep?

A. If it is purely a suction pump, no.

[fol. 496] Q. That is all he describes, isn't it?

A. That is what he mentions, in those terms, yes.

Q. That is all he describes, isn't it?

A. Yes. But in the Simmons patent——

Q. I didn't ask you anything about that.

The Court: Let him explain.

A. In answering that question, in the Simmons patent it states that the preferred form of the invention is a device which would pack off the bottom of the well, establish communication with an area below the packed-off part, and by the flow of the material in the well would overflow the top of the well, and that was the preferred form of his testing device, and in view of the fact that this structure, irrespective of any pump, would perform that, my answer was as I have given it.

The Court: What structure?

A. The Burr & Wakelee structure.

By Mr. L. S. Lyon:

Q. Do you contend that any of the claims here in suit read on the disclosure of this Burr & Wakelee patent?

A. Not if entrapping a sample means to take the sample up in a pipe, and not considering, as the patent says, the preferred form.

Q. This Burr & Wakelee patent describes no valve at all below the packer, does it?

A. No. And if you were going to overflow the top you wouldn't require any valve.

Q. But there is no valve on the pipe in this Burr & Wakelee patent, is there?

A. No

Q. You don't need to argue. Just answer.

A. No.

[fol. 497] Q. Does this patent to Burr & Wakelee state that this apparatus is to be used in a drilling well containing mud fluid?

A. It doesn't state anything about the fluid, but just states that they are going to explore the well at any depth.

Q. Does it say that it is a drilling well?

A. It doesn't say.

Q. It doesn't say anything about a well containing drilling fluid, rotary mud?

A. No.

Q. Was the rotary method of drilling wells known in 1867?

A. No, the rotary method wasn't known in 1867.

Q. Well, that answers the question. Do you see this circle with an "R" in it on the pipe above the lower packer in the drawing of this Burr & Wakelee patent?

A. It is a "K", I think.

Q. It is a "K". All right. What is that, according to the Burr & Wakelee patent?

A. In one form of the invention, when they use two packers, that is the hole through which the material flows into the tube through the confined area between the two packers.

Q. What shuts off the area below the bottom packer?

A. He states that when he uses that hole the lower end of the pipe is closed.

Q. And if this Burr & Wakelee apparatus was run down a well filled with drilling fluid the pipe would fill up with drilling fluid while it was being lowered into the well, wouldn't it?

A. It would.

[fol. 498] Q. Do you now admit or do you deny the use of this Burr & Wakelee apparatus for the purpose for which the defendant's apparatus in this case is used? Do you say it can be used or cannot be used?

A. I think it can be.

Q. I am going to read you from your testimony before Judge Bryant.

The Witness: May I——

The Court: Well, let me ask a question there. If its use depends upon the suction operation how could it be used beyond that distance?

A. It couldn't, your Honor, but that answer is based on the statement in Simmons, which is that——

The Court: No matter what that answer is based on. I am not interested in that. If this Burr & Wakelee patent could be used for the same purpose that the Simmons patent could be used for, I am unable to see how that could be, if the Burr & Wakelee patent depends upon suction for its operation, and the other does not, of course.

A. Well, if we must include, or if I must include a suction pump, as has been referred to here, then it would not be the same structure.

The Court: But that is the patent, isn't it?

A. That is the patent.

The Court: The use of a suction pump?

A. Yes; but the patent shows a structure, and he is asking me if that structure would be capable of obtaining a sample, and by the structure——

The Court: Let me ask you: What would take the place of the weight of the atmosphere as producing the power of [fol. 499] the suction? In other words, how could the sample be lifted?

A. By the pressure within the well.

The Court: If there were pressure enough within the well you wouldn't need any suction pump at all?

A. No. It would overflow the top of the well, and in that case, as the Simmons patent said, you would get the sample.

The Court: But the Simmons patent is not confined to such cases, is it?

A. No, it is not confined to such cases.

The Court: Then that would be a material difference, wouldn't it?

A. Yes, the difference being that in the claims of the Simmons patent the sample is claimed as being caught within the pipe and lifted with the pipe.

Q. Now will you refer to the patent to Carll, No. 73,577, Exhibit H-5? Do you contend that any of the claims in suit read on the disclosure of this patent?

A. No. This was just cited to show the methods at that time of entrapping the fluid from the bottom of the well within a container.

Q. The device actually described in this Carll patent is a pressure bailer, isn't it?

A. A sand pump.

Q. That is a pressure bailer, isn't it?

A. Yes.

Q. And you use such a device to bail out a well?

A. And to obtain samples, as explained by Carll in his literature.

Q. By bailing?

A. Yes; by entrapping it in such a structure.

[fol. 500] The Court: Why is not the discharge of the fluid to be tested into this container in the Simmons patent and hoisting that to the surface a bailing?

Mr. L. S. Lyon: If you had a bailer, you have got to bail out all of the fluid in the well down to the point where you want to get a sample. With the Simmons device you can leave the fluid in and get the sample by shutting off the pressure above.

The Court: The word "bailing" means the removal of everything in the pipe, does it?

Mr. L. S. Lyon: Down to the point where you want to get this bucketful.

Q. Isn't that right, Mr. Abbett?

A. The bailer would extract the sample at the point at which it is opened and it would come in right there by the hydro-static pressure.

The Court: I am asking as to the use of the term "bailer." Does the operation of a bailer mean the removing of all of the contents of the hole to get at that in the bottom?

A. No. A bailer does not function until it reaches the bottom of the hole.

Q. What bails the material above that?

A. As they take it out from the bottom of the hole——

Q. Isn't that done by a bailer?

A. From the bottom of the hole——

Q. No, no. Above the bottom.

A. Yes. Then they continue to bail.

Q. That is a bailer, too, isn't it?

A. Yes.

Q. All right. And the bailer also bails from the bottom of the hole?

A. Yes.

[fol. 501] Q. And from the whole area above it?

A. If it is the ordinary type of bailer that opens at the bottom, first it would have to encounter the bottom of the hole before any of the fluid would be admitted. If it was a type of bailer like a bucket, then any time you lower it and pick it up, of course, you would bail. But sand pumps and the ordinary type of bailer had an opening in the bottom so that you lowered them to the bottom of the hole and took a bailful of the fluid in the bottom of the hole and carried it out.

Q. You could do it just as effectively if you were working on the surface there, couldn't you?

A. Yes. Or pardon me. The upper ends of the sand pumps are closed and the fluid can only get in the lower end, and the only way it can get in there——

Q. What I have in mind is this: You have a well full of fluid and so forth and you must bail that out to take a sample from the bottom, must you not?

A. Not with a sand pump.

Q. I haven't gotten to the sand pump yet.

A. Pardon me.

Q. As the term is generally used, bailing applies to the process of removing that column of liquid?

A. Broadly considered.

Q. Now, you don't have to start at the bottom, do you? You could just as well start at the top and bail, couldn't you?

A. You could. But the structure and the general practice are that they lower the device to the bottom and there it is opened.

[fol. 502] Q. Wouldn't there be some loss in a well of say 6,000 feet deep in going all the way down to the bottom? I would think it would be simpler to start in at the top.

A. But in the use of these devices they want to get the material that is at the bottom of the well, the cuttings and fluid.

Q. How do they know with the ordinary bailer what they have got?

A. They lower it to rest on the bottom and then it opens and the material comes in.

The Court: All right.

By Mr. L. S. Lyon:

Q. You don't desire that the court shall understand that you can take a sample of the natural fluids in the well that are being held back by the pressure of the mud fluid by a bailer unless you bail out all of that mud fluid, do you?

A. No; I don't intend that to be understood. But I intend to state that a sand pump, which is the type of bailer here shown, takes out such fluid as is present at the bottom of the well.

Q. This Carll patent does not describe taking a sample of fluid, does it? It describes taking a sample of formation, does it not?

A. Yes. He gets the cuttings that are at the bottom of the well with the liquid.

Q. If he wanted to get any fluid with this device from the formation in the bottom of the well that was being held back there by the pressure of the drilling fluid above it, it would be necessary for him to remove that column of fluid in order to get a sample with the bailer, wouldn't it?

A. Yes.

[fol. 503] Mr. L. S. Lyon: Is that clear, your Honor?

The Court: It would be necessary to remove the column of fluid, you say?

Mr. L. S. Lyon: That the weight of the column of fluid is holding this natural fluid back and preventing it coming into the well. And, if you stick a bailer down through the column of fluid and try to get a sample, you won't get any because the weight of the fluid is holding the natural fluid back and preventing it from coming into the well.

Q. There is no apparatus on a bailer to pack off the well and relieve the formation from the weight of the mud fluid, is there?

A. No. The bailer or sand pump relies upon the hydrostatic head of the fluid within the hole to move the sample in, and a testing device would pack off that fluid and entrap the sample from the area beneath the excluded column.

Q. What do you mean by a sample in the case of a sand pump such as is shown in this Carll patent?

A. It is the fluid at the bottom of the well, with such materials as may be suspended in it, the cuttings and so forth.

Q. The sample that they look at is the cuttings that they grab out with this sand pump, isn't that correct?

A. Yes. But it must come with the fluid.

Q. You don't know that there is any natural fluid coming in from the formation at all if the well has got a column of mud fluid in it, do you?

A. No. But he wasn't talking about columns of mud fluid.

[fol. 504] Q. Then, he wasn't running this sand pump down through a well that is filled with drilling fluid, is that right?

A. I don't know. He doesn't say that he was.

Q. As a matter of fact, in 1868 and as described in this patent this sand pump of Carll's was lowered by a string of poles, was it not?

A. Yes; an augur stem.

Q. Will you please refer to the patent to Birge, No. 182,093, Defendant's Exhibit H-6? This is like the Carll patent in that all that it discloses is a sand pump or pressure bailer, is that correct?

A. It is the valve for such a structure.

Q. You don't contend that any of the claims in suit here read on the disclosure of this Birge patent, do you?

A. No. This structure shows a valve which opens by lowering and closes when it is lifted to control the entry of fluid into a bailer container.

Q. Will you please refer to the patent to Koch, No. 208,610, Defendant's Exhibit H-7? All this patent discloses is an oil well casing set on a shoe, isn't that correct?

A. That is right. It shows a packer on a shoulder.

Q. How do you know that is a packer instead of a shoe, that part D? Well, I will pass that as it may be a packer. Do you contend that any of the claims here in suit read on the disclosure of this patent?

A. No. This was just to show the state of the art.

Q. The pipe A has no valve, has it?

A. No.

Q. Nor the pipe E? Neither of the pipes has a valve, has it?

A. Not shown in the drawing.

[fol. 505] Q. And the packer or shoe which is numbered or lettered D in the drawing of this patent is on the casing and not on the tube which receives the fluid from the well, is that correct?

A. That is correct. It is a gum elastic packer D mounted on a tubular member, which is in this case the casing.

Q. Will you please refer now to the patent to McGregor, No. 582,828, Defendants' Exhibit H-10? This patent discloses only the casing shoe, is that correct?

A. Not McGregor. Is it No. 582,828 you are referring to?

Q. This patent shows a casing in a well with a frangible disc at the bottom of the casing, does it, and a ball seated also in the bottom of the casing? Is that correct?

A. That is correct. This structure as compared to the ordinary sand pump which we have considered provides means for allowing fluid to come into a pipe which runs from the bottom of the well to the top of the well under a hydrostatic head of the column within the well, and thus distinguishes from the Carll and other sand pump patents

where we have a column within which the fluid can rise to the top of the well.

Q. What McGregor intended to use this apparatus for was to recover diamonds that had been lost in a well; wasn't it?

A. That was one reason. He said that he also could obtain samples of subaqueous bottoms.

[fol. 506] Q. He didn't say anything about obtaining samples of fluid that the well might produce if the pressure of the drilling mud was relieved from the formation, did he?

A. No; he doesn't say anything about relieving the pressure of the drilling mud from the formation. But he does——

Q. Now——

Mr. Boyken: Let him finish his answer.

Mr. L. S. Lyon: I think that answers the question.

The Court: Let him explain.

A. But he does state that he obtained samples of a subaqueous bottom, which would be liquid from some lower region in the body of liquid.

By Mr. L. S. Lyon:

Q. How do you know it would not be samples of the cuttings and that any natural fluids in the formation were held back by the other fluid in the well?

A. I don't know that. But those cuttings would be suspended in the liquid at the bottom of the well.

Q. But not necessarily in any liquid that the well produced, isn't that correct?

A. No; that is not correct because the well is full of liquid. It might necessarily be the liquid the well was producing.

Q. If the well had been filled with drilling mud that was manufactured out of the well, then these cuttings might be suspended in that, isn't that correct?

A. That is correct. They would be suspended if there were cuttings in any liquid present in the well.

Q. You would get these cuttings by the use of this McGregor patent in an analogous manner to that by which you have described you would recover them with a sand [fol. 507] pump in the case of the Carll and the Birge patents, isn't that correct?

A. If you obtained cuttings. But he does not say that the subaqueous bottoms are cuttings.

Q. Do you contend that any of the claims in suit here read on the disclosure of this McGregor patent?

A. No, because there is no packer——

Q. I don't think you need to argue the question. You said that you don't.

Mr. Boyken: I think, your Honor, he ought to be permitted to give his reasons, and, if they are not proper, they can be stricken out.

The Court: Sometimes. I wouldn't say the witness is disposed to argue but he is disposed to say a little more than is necessary. I don't think anything further is necessary there.

A. All right.

The Court: I think you already stated that it was to show the state of the art.

Mr. Boyken: Yes. After all, your Honor, we contend that there is no invention in the patent in suit over all of this art, not separately but collectively, and certain of these patents are more important than others. I think it is really a waste of time to go over each patent and ask the witness if the claims of the Simmons patent are readable on all of these patents here. We contend that there is no invention over the art generally and then we point out about five or six particular patents. There is no use wasting any time beyond those. We don't contend that every one of these patents in the prior art fully anticipate the patent in suit.

Mr. L. S. Lyon: Then why did you put them in?

[fol. 508] Mr. Boyken: To show the state of the art.

Mr. L. S. Lyon: I don't understand what the purpose of showing the state of the art is if it doesn't contain anything that anticipates the invention.

The Court: Proceed.

By Mr. L. S. Lyon:

Q. Referring to this patent to Bloom, No. 785,933, Defendants' Exhibit H-11, which is the one I thought I was looking at before, all that shows is a casing packer shoe, isn't that correct?

A. That is correct; a conical casing packer shoe fitting into a reduced bore.

Q. And you don't contend that any of the claims in suit read on the disclosure of this patent, do you?

A. No. This was to show a "rat-hole" packer or its equivalent.

Q. Will you refer now to the Halliday patent, No. 1,510,-669, Defendants' Exhibit H-15? Do you contend that any of the claims in suit read on the disclosure of this patent?

A. Yes; I do.

Q. Which ones? Which particular claims, or do all of them?

A. I contend that as far as structure goes that all of the apparatus claims are met by Halliday since the limitation of positively pressing against the wall of the formation is an immaterial one and does not define patentable novelty over the showing of Halliday, where the packer is pressed against a metal liner within the walls of the formation.

[fol. 509] Q. Do you contend that this Halliday patent describes the method defined in claims 8 and 18 of the patent in suit?

A. He does not describe a——

Q. Can't you answer that yes or no? I am asking you what you contend.

A. Will you please read the question?

(Question read by the reporter.)

A. No.

Q. But you do contend that you can read all of claims 9 to 17 inclusive and claim 19 of the patent in suit on the structure described and shown in this Halliday patent, do you?

A. Yes; if you ignore the limitation to positively press against the formation.

Q. Let's take the first claim, claim 9. Where is the valve called for by that claim in the Halliday patent?

A. The valve in the Halliday patent is the outer sleeve within which an inner sleeve telescopes and fits, the two members being moved relative to each other by the tube supporting the structure at the top of the well to bring the holes in matched or unmatched relationship and thus to permit fluid to come into the device and to be entrapped when the structure is closed.

Q. This Halliday device is a perforation cleaner, isn't it?

A. Yes. It is a——

Q. Just answer that yes or no.

A. Yes.

[fol. 510] Q. What do you use a perforation cleaner for in an oil well?

A. Normally, you use a perforation cleaner to clean the perforations that are formed in the casing but in this particular device Halliday states that he uses the structure for not only a perforation cleaner but can leave it in the well as a part of a flow device.

Q. Does he say anything about using it for testing the productivity of a formation in a well containing drilling fluid?

A. No.

Q. Referring to this structure in the Halliday patent which you say is a valve, is it possible to close the structure so as to seal off the pipe 34 from the entrance of fluid into the well?

A. Yes.

Q. How would you operate the pipe to do that?

A. You would rotate it from the top of the well.

Q. And that would close all the ports, would it?

A. No. He has a structure here that would selectively close the ports.

Q. And open others?

A. And open others.

Q. In other words, you could not close any of the ports in this Halliday device without opening some other ones, isn't that correct?

A. No; that is not correct. I call your attention particularly to Figure 21, which shows all of the ports closed.

[fol. 511] Q. How would he do that?

A. By rotation of the string of tubing supporting the structure. In fact Figures 18 to 23 show the different combinations of ports which he can close selectively.

Mr. Boyken: There are two Halliday patents, Mr. Abbett. Which one are you referring to?

A. No. 1,510,669.

By Mr. L. S. Lyon:

Q. What does he close them for? What does Halliday state he wants to close the device for?

The Court: The patent shows that, of course, doesn't it?

Mr. L. S. Lyon: He has stated that there is a description here and I would like to have him point it out.

The Court: "My invention relates generally to devices for cleaning oil well casings in the region of their perforated sections and dislodging and disintegrating caked formation which lies around and in close proximity to the exterior surface of the casing."

By Mr. L. S. Lyon:

Q. Does this Halliday device have any packers on it?

A. Yes.

Q. What are they? Is it parts 5 and 6?

A. 5 and 6; yes.

Q. Aren't those swabs in fact instead of packers?

A. No; I don't consider them to be. The fact of the matter is that on page 5, begin-ing with line 99, he says that this device may be used as a packer at any desired depth in the well.

[fol. 512] Q. This Halliday device is adapted to be operated by moving it up and down in a well, isn't that correct?

A. No. I don't understand that to be so because he expressly shows means for locking the structure with relation to the casing in order to actuate it.

Q. Doesn't he move this back and forth in a well to clean off this pipe? Isn't that what he describes doing?

A. I don't recall that.

Q. There is no way of setting this packer in this Halliday device, is there, in the sense that you expand the packer in the Simmons tester or in the plaintiff's or defendant's testers?

A. The packers are mounted on a sleeve and form a sealing fit with the casing.

Q. How would you get that device down a well that was full of drilling fluid?

A. You could either by-pass the fluid through it or move it down.

Q. What is going to happen to the mud fluid ahead of it?

A. Well, such mud fluid as was ahead of it would be forced out through the perforations.

Q. This device is not adapted to be lowered down a well that is full of drilling fluid, is it? It is not operated under those conditions, is it? You know that, don't you?

A. I know that.

Q. And it doesn't have on it a packer, in the sense of a device that is contracted going down the well, so that it can pass through the drilling fluid and at some point in the [fol. 513] well is then set and expanded to shut off the drilling fluid; isn't that so?

A. That is correct. That type of packer was old in the art and is not shown here.

Q. And wasn't intended to be used on the Halliday device, was it? He wanted this type that would swab the casing as it went down; isn't that right?

A. No, I don't understand that he wanted to swab the casing as he went down, but he wanted to form a seal so that he could clean or wash at different zones when he got there.

Q. Then this device can't go down the well if it contains drilling fluid unless the valve is open, can it?

A. No, I don't believe it could.

Q. Now, will you return to the Macready patent, No. 1,522,197, Exhibit H-17? Do you contend that any of the claims in suit read on the disclosure of this Macready patent?

A. No. This was cited to show the use of a "rat-hole" packer on a testing device.

Q. There is no valve on the Macready device, is there?

A. No, there is no valve on it, but in considering the patent I had in mind——

Mr. L. S. Lyon: I don't need an argument from the witness as to why he cited it. I am trying to distinguish it in accordance with your Honor's suggestion here, as quickly as I can.

A. There is no valve in it.

Q. And it is a two-string device, is it not?

A. Yes.

[fol. 514] Q. And there is no disclosure in the patent of recovering any entrapped sample, is there?

A. Not by elevating the drill pipe, no.

Q. Now, referring to the publications, the three publications that have been offered in evidence here as Defendants' Exhibits I-1 to I-3, do you contend that any of those describe the recovery of an entrapped sample by elevating the pipe containing the sample, those publications?

A. No, except in the use of the sand pump.

Q. And in that case the sand pump was used in the manner we have already discussed this afternoon?

A. Yes.

Q. And it doesn't need to be repeated. And none of those publications describes an apparatus for testing the productivity of a formation encountered in the drilling of a well, which apparatus has a valve structure to be opened to receive a sample and to close to entrap the sample while the pipe is being lifted out of the well; is that correct?

A. That is correct. They show the use of the packer with the test string used for testing selected areas of the formation.

Q. That is already shown, or that same thing is shown in the patent to Koch, No. 208,610, Exhibit H-7, is it not?

A. It shows the structure, but it does not show the thing described as being used as a flow device and for the purpose of making tests in a well, and that is why this literature has been cited.

Q. At the time these publications were written were wells drilled by the rotary method?

A. No, they were not.

Q. I have just a few questions to ask you about the Franklin patent, additional questions, and then we will have cov- [fol. 515] ered all of the prior art cited by the defendants. The Franklin patent was taken out before rotary drilling was used; isn't that correct?

A. Yes.

Q. Is there any statement in the Franklin patent to the effect that the device is to be used in connection with the dril-ing of a well at all?

A. No, there is not.

Q. Does Franklin refer to making any tests during the drilling of a well to recover a sample of natural fluid in the well?

A. No, he does not use the word "test" in the patent.

Q. Does the Franklin patent anywhere describe or direct that any entrapped sample shall be recovered?

A. He does not direct that any entrapped sample would be recovered, but he describes an operation of the tool whereby it would be recovered, when he states that the lower valve is closed before the withdrawal of the tool from the well.

Q. I refer now to this Franklin apparatus being used for recovering an entrapped sample, that you could only use it to recover an entrapped sample provided a packer was employed for the purpose that I have stated.

A. Yes, to obtain an entrapped sample from the bottom of the well.

Q. Now, according to the disclosure and specific directions of this Franklin patent, the purpose of the valve structure was to keep fluid out of the pipe both going into and coming out of the well, and there is no disclosure anywhere in the Franklin patent of using the valve structure to control the flow of fluid into the pipe and entrapping the fluid in the pipe, is there?

[fol. 516] A. I don't recall any statement that the structure keeps the fluid out of the pipe coming out of the well. If you will point it out—it says that they would keep it closed coming out of the well, but——

Q. Now, he says—look at line 20, page 1: "My device is intended to perform the offices of two different classes of devices now in use for controlling and regulating the flow of wells, as follows: When the tubing is being put into the well or withdrawn from it, it is desirable that no flow take place through it. This is effected, so far as the placing in of the tubing, by a brittle disc, which is placed in the tubing at one of the lower joints, and which closes the tubing until it is broken, which is done after the tubing is in the well by dropping down upon it a sufficient weight to break it; but this is of no service in keeping the tubing closed while drawing it, and, indeed, there is no device to my knowledge, except my own, which will close the tubing while it is being drawn."

A. That is correct.

Q. Do you find any statement there that any fluid is to be entrapped in the pipe and withdrawn with the pipe from the well?

A. No, he doesn't say that. He says he wants to keep the pipe closed as he comes out, and if it was standing with fluid in it and the pipe was closed it would remain in it.

Q. But he doesn't mention that there is to be any oil or other fluid in the pipe while the pipe is coming out of the hole, does he?

A. He doesn't make that statement. If there was oil in the pipe it would be closed——

Mr. L. S. Lyon: Now, I think that is just argument. I think that is all, your Honor; I think that completes our cross-examination.

Mr. Boyken: No redirect examination.

[fol. 517] Paul J. Howard, called as a witness on behalf of the defendants, being first duly sworn, testified as follows:

Direct examination.

By Mr. Wright:

My name is Paul J. Howard. My occupation is petroleum engineer. I am now employed by the State of California, in the Division of Oil and Gas, and am in charge of the Bakersfield office of the Division. As to my duties in relation to testing of water shut-offs, occasionally I make tests myself but I supervise the work of two inspectors and take over their tests that are normally made in this connection and give the final approval in cases of shut-off and decide as to tests that are turned down.

On the 20th day of October, 1935, I witnessed a test on the Union Oil Company well S. & M. 29. I have already examined Defendants' Exhibit K, and it was either that tool or one just like it that was used. I visited the well. The drill pipe with this tool was in the hole at that time. I witnessed the packer being set and the valve opened, and as soon as the valve was opened—I had better state first how the packer was set. The packer was set by rotating the drill pipe to the left. Then the valve was opened by rotating the drill pipe to the right, and immediately the drill pipe was rotated to the right a blow of air occurred from the drill pipe. A rag was placed over the top of the drill pipe dampened with mud, to show the air flow from the drill pipe. It immediately blew up as soon as the valve was opened. A fairly strong blow occurred for about four [fol. 518] minutes, followed by slightly less blow for 13 minutes. At the end of that time the drill pipe was rotated to the left, which closed the valve, and this was shown to be the case by the fact that the blow immediately ceased, and, to be sure that the blow hadn't ceased because of

some condition in the well, that was opened again, and then the blow started again, and the pipe was rotated back, closing it. Then the drill pipe was raised, which released the pressure, and it was held in that position, and we tried to determine then whether the valve had leaked, so we kept this dampened rag over the top of the drill pipe, and there was no further blow of any kind. If there had been a leak this would have been evidenced by the fact that the mud around the drill pipe would have dropped in the hole. That did not occur. The drill pipe was then pulled from the hole, and each time a stand was disjointed and set back on the derrick we had a chance to check the fluid in the hole, and there was no evidence of any dropping of the fluid in the drill pipe while it was standing idle. When the drill pipe was completely removed we found that it contained 150 feet of fluid. The top 100 feet of fluid consisted of gas and oil-cut mud, and the bottom 50 feet consisted of mostly—there might have been a trace of mud in it—but mostly of fluid. We could see that it was practically all oil and oil sand. And with the tool hanging in the derrick below the last joint of drill pipe there was no leakage from the tool. If there had been it would have been evidenced by an oil leak, inasmuch as oil was found in the bottom of the tool, with no evidence of further water. On the basis of that showing I approved the test of shut-off, as indicating that no water had access to the hole from above the point of cementing the casing in the hole.

[fol. 519] The type of packer that was used upon that test is the packer that was commonly used by the Johnston Testing Tools. Defendants' Exhibit G illustrates the type of packer that was used. The packer over here on the larger tool, that is the type that was used. This well was located in Kern County and was between sixteen and seventeen hundred feet in depth. I have not the exact figure with me but it was somewhere around 1,650 or 1,660 feet where the shut-off was made. Water shut-off tests are made to demonstrate that when the casing is cemented in the well that all fluids above the shoe of the casing have been excluded from the well; in other words, that no fluid can come down around the outside of the casing and get into the hole. It is not the purpose of a water shut-off test to test the productivity of the formation. I have

already testified that I had to pass upon all tests in the Bakersfield office.

Q. Do you recall any test made by the Halliburton Company in which a straight wall or hole packer was used in effecting a seal in the casing?

A. So far as I have any knowledge there has never been a straight hole packer used whereby the slips and packer were set by setting the bottom of the drill pipe or the anchor that is provided below it, this perforated pipe or any other pipe below the tester, being set on bottom in order to set the slips.

Mr. Wright: You may cross-examine.

Mr. L. S. Lyon: I move to strike the testimony of the witness, your Honor, on the ground that it is not material to any issue in this case. It appears from the witness' testimony that he was using a combination device here that [fol. 520] was the subject of the discussion had this morning. It is the same proposition.

The Court: The motion is denied.

Mr. L. S. Lyon: An exception.

Cross-examination

By Mr. L. S. Lyon:

In 1919 I started working for the Standard Oil Company in the oil fields just after being released from the army and I was there for six months. Then for a year I was away from it. Then I commenced college, studying petroleum engineering. That was in 1920. And since then I have either been at college or in the oil fields or in the petroleum industry. I got out of college in 1924. I have not worked for the State ever since that time. I worked for the Standard Oil Company at the El Segundo refinery in a petroleum technological capacity for four years and a half. Since the fall of 1928 I have been concerned with water shut-offs and oil well tests. I have been with the State Division of Oil and Gas since that time.

The first occasion I had to actually witness a test of a well with a formation tester was while I was in the Taft office in 1932. Prior to that time other methods were used as a general rule. I witnessed tests by the Standard Oil Company and Honolulu Oil Company and I won't say as

to any others. The first knowledge I have of this tester being used was while I was with the State Mining Bureau in the Long Beach office. These testers were not used at that time in the Long Beach field but our Division witnessed tests of these devices in other fields at that time. I [fol. 521] would say that the first time that these testers were being introduced in the State of California was about 1930, although I can't give you the exact time. I never saw a device like this Defendants' Exhibit K used before this incident on October 20, 1935. I examined the inside of the valve in Exhibit K. I examined it and my test indicated that it did not leak. It seems to me that the test I made indicated that conclusively it did not leak. I see no reason why it should leak from my examination of it. I examined the construction of the valve inside and I realize that there is a little play in that valve. As to how the construction of that valve compares with the drawing of the Franklin patent, Defendants' Exhibit H-9, I have never made a detailed study or comparison of the two instruments. Looking at the drawing, the device itself is very similar to this drawing. I wouldn't say that it is made exactly as this is made. There is a difference possibly. There are no scales given on here, but there is a difference possibly in the size of the opening. It may be somewhat different. But the method of aligning the holes in both plates is similar. According to this drawing in this patent fluid could not pass into the chamber above the valve, but it appears from this drawing that it could pass into the chamber below.

Q. That would mean that while the valve was being operated to take a test, that is, the valve was standing open, the mud fluid or drilling fluid could flow down from outside of the drill pipe, down at the point you have indicated in the structure, and down below the packer, could it not?

A. No; it couldn't.

[fol. 522] Q. Why not?

A. I am not familiar with the details but I know that it didn't on the test because we checked the fluid in the well and that was conclusive proof that it didn't occur.

Q. But look at this drawing.

A. I can't argue about the details of the drawing because I made no study of it. I wouldn't want to say about the drawing but I know that it didn't occur.

Q. If it was made in accordance with that drawing, that would occur, would it not? You are an engineer and that is a very simple drawing.

A. It is very simple but it hasn't enough explanations to enable me to state definitely.

Q. You can't tell, then, from the patent whether the device would prevent that flow of drilling fluid, if any drilling fluid was there, or not? Is that your answer?

Mr. Wright: If your Honor please, I don't know if I am clear on the question. Does that relate to the drawing or to the patent?

Mr. L. S. Lyon: To the drawing of the patent.

A. The drawing itself is not self-explanatory. As you will note, there is plenty of description goes along with it, which I have never read.

Q. The whole patent is only a page and a quarter long. You had better just look at it and see if you can find anything——

A. I wouldn't attempt in a moment's perusal, with that description on here, to come out with a full-fledged statement of whether it would work or wouldn't. I don't consider myself capable of doing it in that short a time.

The device that I refer to was not welded up when it was pulled out of the hole. It was taken apart by un- [fol. 523] screwing various parts. I would not say that there is no weld in the device at all; I didn't say that. It may be in certain places. Parts of it might have been welded up at the time that I saw it run. I don't know whether it was. Looking at the Defendants' Exhibit K now, I see that a weld has been put on it at this point, where it has been spot welded. And the evidence is here that it has been spot welded at that position. That device was not cut loose to show me. There was no welding device used to open that valve when I saw it. It hadn't been welded when I saw it. I don't say it wasn't welded prior to that time but it was not welded when it was in use in the test I witnessed. It was merely unscrewed and taken off. There are two welds on here, one on each side. That shows where probably it was together at some time or other but it wasn't at the time I made the test. I don't know whether those weld marks were on there at the time I made the test. It was not welded shut at that

time. I don't note any welding in the drawing of the Franklin patent.

Q. If the valve when opened did allow mud fluid from outside the drill pipe to run down through the valve and into the formation below the packer, would that destroy the test?

A. Possibly. It would depend on the amount.

Q. If there was any appreciable clearance of that kind, then the pressure of the drilling mud would be rapidly imposed on the formation below the packer, would it not?

A. After the valve was opened; yes.

[fol. 524] Q. And wouldn't that destroy a test?

A. If there was any appreciable amount. Of course, if there was a small amount, which we could measure at the surface, then we could account for that much mud being in the drill pipe when it was withdrawn, but, if there was any great amount of leakage, it would be impossible possibly to measure it accurately; and in that case we would consider that the test was not effective.

Q. Did you consider this a satisfactory test?

A. I did.

Q. And you had no difficulty in knowing whether the valve was opened or closed?

A. No difficulty whatsoever.

Q. Where did this oil come from in this test?

A. The oil came from the formations below the point at which the casing was cemented.

Q. I thought you said you were making a test to determine whether the pipe was dry.

A. You are correct. I made the test to determine whether any water had access to the hole from around the casing, and there was no such access. But in connection with that, in practically all of our tests, due to the fact that some formation had to be left open below the shoe, there is liable to be some fluid, oil or water or whatever the case may be, come in from those formations that are open. They are not necessary to the test but they occur with it and we value them for whatever value they may have.

Q. Then, when you make one of these casing tests, incidental to that you do actually test the formation ahead of

A. For whatever amount is open to the hole; yes.

[fol. 525] Q. And there is always some open?

A. Yes. There has to be some open at all times.

Q. And the packer is positioned in the well truly in the casing but so positioned relative to the formation that it is adjacent to that formation that is open below the hole?

A. Yes. The packer is usually set at a point from 5 to 10 feet above the casing shoe.

Q. Therefore, the packer relieves the open formation from the pressure of the drilling mud up in the well, does it not?

A. That part that is open to the hole at that time.

Q. In other words, the packer does that whether you set the packer towards the lower part or bottom of the casing or whether you set the packer out against the formation itself?

A. Well, if it were set against the formation itself, we would be unable to make a test of shut-off under those conditions.

Q. But I mean so far as testing the open formation.

A. Yes.

Q. The packer performs the same function whether set in the bottom of the casing or set against the formation itself?

A. Yes. I admit that any formation that is open to the hole below the casing shoe at the time of that test is relieved of the pressure of the mud fluid that surrounds the drill pipe.

The only disc employed in this Defendants' Exhibit No. K was the disc that you see with the opening in it. There was nothing in the drill pipe to keep the drill pipe dry other than in this valve. I didn't employ any go-devil. I was not present at the time this device was started at the [fol. 526] top of the well, but I saw it when it was withdrawn from the hole and saw it completely taken apart, and examined it carefully at that time. I didn't see it go into the hole. The drill pipe was down in the well at the point where it was desired to set the packer when I got there; it had already reached that point.

FREDERICK A. HEITMEYER, called as a witness in behalf of the defendants, being first duly sworn, testified as follows:

Direct examination.

By Mr. Wright:

My name is Frederick A. Heitmeyer. My occupation is petroleum engineer. I am a graduate of the University of California at Berkeley and have a degree in geology and petroleum engineering from that university. I am now employed by the Standard Oil Company of California and reside at Taft, California. I am employed as a petroleum engineer and have charge of a considerable number of tests, both shut-off and formation tests, with the Standard Oil Company. I determine points for cementing casing, and other duties that are given to a petroleum engineer.

I have been present a considerable number of times when the Johnston device was run; I would say about 125 to 150 times. In my opinion, the function of the trip valve is to serve as an entrance valve, to permit the entrance of a mud fluid, a cognate fluid, or gas or water, or whatever the case may be. It serves another purpose, and [fol. 527] that is, it gives a very positive indication that at the time the test was made no drilling fluid had entered the drill pipe. In my opinion, the Johnston device would not be operable to entrap a sample, under normal conditions existing in a well, without the use of a trip valve. My reasons are that we have no control over the actions of the main valve or bottom valve. We do not know whether or not we are going to encounter obstructions in the drill hole or bore hole which will give sufficient weight to the packer, that the packer will take sufficient weight to open that bottom valve. The hydrostatic pressure from below in a hole in the normal setting of a packer would cause the main valve to open prior to the time you are ready to take a test.

In making a formation test we ordinarily run the drill pipe dry, that is, with no fluid in the drill pipe above the trip valve, under normal conditions. The packer is run to the seat or tapered shoulder, where the "rat-hole" or smaller diameter hole starts. It is then spudded. What I mean by "spudded" is that we pull it up and set it firmly,

so that it will be firmly seated in that shoulder, before we drop the go-devil. In that spudding operation we give it the full weight of the drill pipe, or sufficient weight to open the main valve, before the go-devil is dropped. During the spudding operation if the trip valve was not in the tool or in the pipe the fluid would have access to the drill pipe and would nullify the test, or the information would not be satisfactory. The function of the main valve is to entrap the fluid sample, after the trip valve has been opened and as the drill stem is being withdrawn. I believe that it is necessary in drilling operations to use de-[fol. 528] vices through which circulation may be established at will, so as to prevent possible blow-outs; and by "blow-outs" I mean gas overcoming pressure induced by the weight of the mud. If a well blows out it may mean the total loss of the well. Another purpose for utilizing circulation, other than taking care of blow-outs, is that sometimes in withdrawing the packer it will meet an obstruction in the hole, and it will stick, as we call it, freeze, and we would have to circulate it loose. In both of the instances that I have mentioned I have assumed a condition where the tool has been partially withdrawn.

I am still employed by the Standard Oil Company.

Cross-examination.

By Mr. L. S. Lyon:

I graduated from the University of California in 1924 and have been employed in the oil fields from 1924 to date, always in the employ of the Standard Oil Company of California. I first saw a formation tester in 1933. That was not the first time I had known of one being used by the Standard Oil Company. The date of the first use by the Standard Oil Company that I know of, I believe was in 1930, but I cannot give you the exact date. Up to 1930 the Standard Oil Company of California tested the productivity of formations in their wells, in the first place, by coring and sampling of formations. If samples indicated that formations were productive of either oil or gas, a string of casing would be cemented above that. We would then either bail or swab or employ a gas lift to remove the drilling fluid from the well. The Standard Oil Company uses the formation tester extensively, in lieu of

the method of setting and bailing or swabbing casing that [fol. 529] I have just referred to. The advantage of the formation tester over the earlier method is that, although we may examine core samples and think that they contain either oil or gas, we may not be certain. So, therefore, we may have set a string of casing and the formation would not be productive. If that occurs, we just either go on deeper or abandon the well. It means that I would have set a string of casing, that we have to leave there, and also that in continuing our well we would have to drill with smaller pipe or drill a smaller hole.

The trip valve in the Johnston device is opened by a go-devil, which I believe is a valve. I would define a valve as an apparatus to permit the ingress of a fluid. I don't see where a valve is a device that can be opened or closed to control the passage of fluid. During the time that this trip valve is in the pipe, before the go-devil is operated, it is a complete barrier to the passage of fluid, and when you drop the go-devil down the trip valve is no longer operative; so that it is either capable of performing no function or else it is a complete barrier or stop in the pipe. It serves as a valve that you open to permit the ingress of fluid; but you can't close it to prevent the fluid from passing back out of the pipe. I don't know what you refer to when you speak of the use of a barrier in a pipe to keep the pipe dry while it is going into an oil well and to be broken by a go-devil when desired. To my knowledge I never heard of a go-devil being dropped into a drill pipe or a pipe in a well before these sand testers came out. I don't know whether that was something new that was devised for use in sand testers or not.

[fol. 530] Q. Now, as you understand this Johnston tester, can the main valve be opened or closed without moving the pipe, if the packer is properly seated?

A. By that do you mean without moving the entire string of drill pipe?

Q. Oh, no. I mean by lifting on the upper end of the pipe or lowering at the upper end of the pipe.

A. Certainly. It can be closed by the seat giving way.

Q. I said, if the seat holds out and the packer is properly seated on it.

A. You would have to relieve at least some of the weight of the drill pipe.

Q. You would have to lift up on the drill pipe to close the valve, would you not?

A. The main valve?

Q. Yes.

A. No. The spring would close it.

Q. How would the spring close it? Now, you just tell us that.

A. I would picture the spring nut—we would have a string of drill pipe in the hole, with a certain amount of weight given to—I am assuming that the packer is set on the seat. Our drill pipe is in the hole and we give it a certain weight. By giving it weight we flex the drill pipe. I cannot imagine any string of drill pipe being given weight and still remain in perfect perpendicular. So that you pull up on your drill pipe as you are unseating or closing the main valve. That takes some of the spring out of it until such time as the weight removed has been sufficient to allow that joint operation to act and close your main valve.

[fol. 531] Q. You think the spring actually pushes the drill pipe up in the well?

A. I do not.

Q. Well, the drill pipe has got to move up to close the valve, hasn't it?

A. But you can see, if you have a little bend like that and straighten it out it would not lift--the drill pipe——

Q. How would you straighten it out?

A. The spring would have sufficient force to do it.

Q. Wait a minute now. You have got a bend in your drill pipe. How is the spring going to straighten the bend in the drill pipe?

A. The thing is that you have a strain on the end of your drill pipe at the top, and you are tending to straighten that drill pipe out.

Q. So you are holding the valve open?

A. The weight of the drill pipe prior to taking it up has been holding it open.

Q. The only way that it can close is for the valve head to move up in the well; isn't that right?

A. That is right.

Q. And that valve head can only move with the drill pipe, because it is an integral part of the drill pipe?

A. Surely.

Q. Therefore the only way that the spring could move the valve head up would be by pushing the whole integral structure forward, that is, the valve head and the drill pipe; is that right?

A. I can't see that.

[fol. 532] Q. How would you get the valve head to move up by straightening out the drill pipe?

A. You would have relieved the weight sufficiently upon it so that the spring can act on it.

Q. What do you mean, act on it? Does it push it up the hole?

A. No, it does not. I have never been down there, so I can't say what happens, but whether the packer has a certain tendency to come up out of there or not I don't know.

Q. The spring is pushing the packer down, isn't it? The tendency of the spring at the under side of the spring, is to push the packer down?

A. That is, it also tends to push the drill pipe up.

Q. In order for the packer to open the valve, the packer has got to give way and move down, isn't that right, or the seat give way, whichever you want to call it?

A. I don't believe I understand that question.

Q. If the packer stays firmly seated and the seat holds, then the only way you can close the main valve in the Johnston device is by having the valve head move upward?

A. Yes.

I recognize Figure 1, entitled "Johnston Formation Tester," which is Exhibit B to the defendants' interrogatory answers, as a drawing of the Johnston tester that I have been referring to. The part marked "Main valve 41" is what you and I have been talking about as the valve head. That is the head on the main valve. And the seat is indicated on this drawing as seat 40. This valve head is integrally tied, so that it must move with the drill pipe, and can't move independently of the drill pipe. The valve seat, on the other hand, is connected with the packer, and [fol. 533] the packer assembly with the valve which slides up and down on the other part, and I would say that in order to open the valve you would have to compress that spring. The main valve is opened by downward movement of the drill pipe, which causes the main valve head to move away from the seat by downward movement of the drill pipe.

and that would happen whether the spring was there or not.

Q. You close the valve by lifting the drill pipe, which pulls your valve head back up?

A. It makes a seat there.

The Court: Why does raising the pipe pull the valve head back up?

A. Because this is on a mandrel. I think if we had a working model——

The Court: Would the answer be that it integrally connects?

A. Connects to this portion here.

By Mr. L. S. Lyon:

Q. The drill pipe, therefore, would pull that valve head up, whether the spring was there or not, wouldn't it?

A. If you pulled on it enough.

Q. Is it your testimony that this spring forces the drill pipe actually up the well to close this valve, or do you have to lift on the drill pipe to close the valve?

A. I would say that you would have to lift on the drill pipe to close the valve.

The springs on these testers vary with different sizes of spring. I think in the small tool it requires, in the 3-inch tool, about 6500 pounds to compress it, and in the larger one about 19,000 pounds. A 5-inch drill pipe will weigh 25.2 pounds per foot, the pipe that we use. We [fol. 534] use 5-inch drill pipe sometimes to a depth of 8,000 feet or more, and it is on testers run with this size and length of drill pipe that we use the large springs.

Q. Therefore, what percentage of the weight of the drill pipe is represented in the power of this spring that you have referred to?

A. Probably not very much.

Q. Well, how much in rough figures?

A. Well, it is 8,000 feet and it weighs 25.2 pounds per foot.

Q. Would that be 1 per cent or ½ per cent or what?

A. I haven't a paper and pencil handy to figure it out.

The Court: 8,000 times 25 would be 200,000.

A. Say, it takes 20,000——

The Court: 20,000 is one-tenth. That couldn't be.

By Mr. L. S. Lyon:

Q. Anyhow, without stopping to calculate it, you don't seriously want the court to understand you to say that this spring is strong enough to pop that drill pipe up the well or push it up the well?

A. To push the drill pipe up, no. I didn't intend to convey that impression, that it had strength enough to push the drill pipe up the well.

This main valve cannot be closed unless this valve moves up the well in normal operation, and it can't move up the well unless the drill pipe moves up. The drill pipe moves up or this part moves down. In the normal operation of closing this valve the packer does not move down. It stays still. I don't believe I am qualified to answer as to why they have a spring on this Johnston tester. I think that the spring helps, or it regulates the tension, in the first place, that you have to put on, or the weight that you have to put on, to open this main valve, the [fol. 535] weight that you have to put on it. One of the reasons, I think, it is put in there is to resist any opening of the main valve while the device is going into the hole. It does that. I think perhaps the springs are the same for all jobs on a certain sized tool. The strength of the spring can be regulated with the tension nut. I think that it would probably be true that you set up the tension on the springs to give a greater power or a greater force, tending to keep that valve closed for deeper wells. It isn't a fact that in the normal operation of the Johnston device the main valve does not open going down the hole. I should say that it does open quite frequently. That is not the usual thing that happens, but I say I have seen it happen in a good many instances.

By the Court:

Q. Do you think that the use of the spring is to prevent the main valve from opening as it is going down?

A. To prevent it, with a minimum amount of weight, of course.

Q. That is, from opening accidentally? As the drill pipe is being lowered they don't intend that the main valve shall be open at that time, do they?

A. Well, your Honor, I believe, if you will allow me, we really have no control over that main valve as we are running in the hole.

Q. I assume that you don't but you do want it open as it is going down or do you want it closed?

A. It really makes no difference to us or to the test with the trip valve in here. The function of this main valve is to trap the sample.

By Mr. L. S. Lyon:

Q. Why don't you leave the spring off?

[fol. 536] The Court: I have an indistinct notion but it seems to me that the function of that spring is to keep the main valve closed as the drill pipe is going down because, when the packer is seated, then the full string of pipe is lowered. And that opens it, doesn't it?

A. By the same token, your Honor, the giant spring would keep it closed coming out.

Q. Would keep it closed coming out?

A. Yes. So that you have an entrapped sample.

Q. But it is closed coming out because one part is pulled up against it?

A. Pulled up against it; yes.

Q. And the spring resists that, doesn't it, or does it?

A. No.

The Court: All right.

By Mr. L. S. Lyon.

Q. Let's get it clear now. When you are pulling this tester out of the hole you are actually pulling up against this main valve?

A. Yes.

Q. And all this packer and everything else hangs on that main valve head and is pulled up by the main valve, is that right?

A. Well, I don't know.

Q. You can see it right there, can't you, in the drawing? In other words, the part that you rely on in this device to pull this packer out of the well when you pull the device out of the well is this main valve, isn't it?

A. Is this not all an integral part of it?

Q. This is all slideable, isn't it, on this part that carries the valve head? All this structure ~~here~~ is all slideable [fol. 537] and it is all urged downwardly by this spring, is that right?

A. Yes.

Q. So, therefore, if something happened to cut away this main valve, you would leave that packer in the hole, wouldn't you?

A. I have never seen it happen.

Q. But you can see, if something did cut that main valve head away, it would stay in the hole because there would be nothing to pull it out? Can you see that from the drawing?

A. Well, I don't know exactly what you are getting at there, Mr. Lyon.

The Johnston main valve is frequently opened while the device is being run into the hole, but usually it does not open. The way we tell whether it has opened or not is that we know how much weight is required to open that valve against the hydrostatic head, and, if we give it the full weight of the drill pipe to spud through a tight place, most certainly we would assume that the valve is open. The nature of the main valve is such that it will open under such conditions. We take precautions in drilling our wells or preparing them for these sand tests to guard against the main valve opening under such conditions by running a trip valve in. We as operators usually prepare our wells by putting a reamer on the bit so as to be sure that the hole is out to gage and that there are no irregularities in the hole before we run one of these sand testers. That is done for the purpose of being sure that the device does not hang up but has a clean, true and accurate and full-sized hole to go in. But I have seen plenty of holes where the device had to be spudded. The [fol. 538] usual operation in our wells, in the Standard Oil wells that we are drilling with our own crews, is to take every precaution to see that the tester does not hang up going down the hole. These precautions are taken because it is good drilling practice to always keep your hole in good condition and good shape. One doesn't always know what condition the hole is in. We wouldn't run a tester in a hole that we knew was in bad condition, because it would not go down; there is no use running it in the hole if it won't go to bottom. We specially examine the lower portion of the fluid, the fluid that is closest to the bottom. That fluid is not necessarily the fluid that has been entrapped below the point where the trip valve is located and above the main valve. As a rule we usually examine the fluid just above the tool. That is our usual practice. Yes, we

examine the fluid that is below the trip valve and that is in the tester. We also take into consideration and rely for examination on the fluid that is recovered in this tester and entrapped and brought out of the well below the point at which the trip valve is positioned. If I had to choose any particular part of the fluid that is recovered in one of these samples and rely on it alone, I would take, as nearly as I could, the last fluid that came into the tool; that would be the fluid that was down right at the bottom. In a deep well it is not unusual to put the trip valve a thousand feet above the tester; that is often done. If a sample is recovered extending 500 feet, that wouldn't be unusual, although the trip valve was a thousand feet above the tool. In that case all of the sample that was recovered would be below the trip valve. Another thing, when the trip valve is positioned a thousand feet above the tester, in the instances I have been referring to, the tester is actually [fol. 539] lowered down the well for the first thousand feet without any trip valve on the pipe.

Q. During that time don't you take precautions to see that the main valve does not open and fill that drill pipe with mud fluid?

The Court: I don't know whether I am clear on the question.

Mr. L. S. Lyon: I think the witness understands me. They make this pipe up at the derrick and lower it, that is, put it together and gradually lower it. If they are not going to put the trip valve in until they have got a thousand feet of pipe on top of the tester, then during all the time they are going down for a thousand feet they are running the tester in without the trip valve.

The Court: If a thousand feet above the main valve a leak occurred, it would get into your testing substance, would it not? Your trip valve would not stop that or would not prevent that?

A. No, your Honor. If the drill pipe were full of fluid, you wouldn't expect any foreign mud fluid from the outside to go in.

Q. What I am getting at is this: As I understand the testimony, the trip valve insures purity in your testing substance?

A. Yes; it does.

Q. Very well. Suppose that there were a thousand feet between the trip valve and the main valve, there would be the same danger in that thousand feet that there is in any other thousand feet of deleterious or foreign substances getting into the pipe, would there not?

A. But we purposely fill that drill pipe with fluid.

[fol. 540] Q. You don't do that to begin with, do you?

A. Yes.

Q. As it is going down?

A. As we lower the drill stem we purposely fill that drill stem with fluid.

Q. What kind of fluid?

A. Either water or mud fluid, drilling fluid.

Q. That is news to me. I thought that drill pipe was clear, that it was full of air only.

A. The purpose of that fluid is to provide a cushion. That is the way we explain it. In other words, not only a cushion but we have—or the drill pipe is collapsible with pressure exerted from the outside, and, if you have too much of it in the hole, it will collapse by the weight of the mud fluid outside if you haven't any fluid inside of the pipe.

Q. Yes. I can see that. Does this best steel pipe ever collapse?

A. Yes; it does.

Q. 6-inch or 8-inch pipe?

A. Yes, sir.

Q. You have got to have something in it, then, to prevent it from collapsing?

A. Yes, your Honor.

By Mr. L. S. Lyon:

Q. Only in deep wells that is true, isn't it?

A. Of course, it depends upon the make or the grade of steel that you are using.

By the Court:

Q. Suppose it is a deep well. You must get that substance out of it before you take your test? I will call the [fol. 541] substance the material that you are going to test and that you find in this "rat-hole." You must eject that substance out first, must you not?

A. It goes up through the trip valve and is the substance above your entrapped sample. For instance, if we fill a thousand feet of drill pipe with mud fluid, above that thousand feet we would have a trip valve.

Q. Come over here. Here is your drill pipe and that is your packer, isn't it?

A. This is the packer.

Q. Your main valve is up here, isn't it?

A. This is the main valve here.

Q. Where did you say the main valve is?

A. This is your main valve here.

Q. Do I understand that between the main valve and the trip valve——

A. We have a thousand feet of drill pipe filled with either mud fluid or liquid of whatever kind we have.

Q. What you want to do is to get the substance down at that perforated point to make your test?

A. We want it to come in through that perforated nipple and up through this valve, and after we have secured what we consider a desired amount, then, of course, you see the main valve will enclose and entrap it.

Q. Yes; I understand. What do you do with the substance that is here, that you do not want to test, when you are getting that from down there up here?

A. When we have recovered it we just disregard that. After we have made our test, if we put a thousand feet of fluid in there in the first place, after making the test and withdrawing it, we may have 1,500 feet of fluid in the drill pipe. So then we consider that 500 feet of foreign material has entered.

[fol. 542] Q. Which 500 feet is it?

A. It would be the bottom 500 feet, we would assume.

This proposition of putting a certain amount of fluid in the pipe above the valve is a safety factor for testing in deep wells. It is not used in a shallow hole at all.

The Court: Even so, it seems to me that there would be difficulty in preserving the identity of the contents of the "rat-hole."

A. There really is not, your Honor.

Q. There is not?

A. No. They are usually quite easy to identify. You have a certain kind of a mud fluid that you put in there

and, although you may have some contamination at the juncture of the two fluids, I think that the other fluid would probably be representative of your cognate fluid.

By Mr. L. S. Lyon:

Q. If you put a thousand feet in there on going down the well and had only a thousand feet when it came out——

A. The weight of the mud is sufficient to withhold the fluid from entering.

I believe I can say that the 125 times that I have seen the Johnston tester operated were all on the Standard Oil Company wells. I was there as an engineer, required to be present on the test so that I could determine or witness the results of the test. The Johnston Company also has a man present on these tests. As to the number of men usually present in making one of these tests, as a rule there will be five men on the drilling crew, one Johnston operator, perhaps a drilling foreman, and an engineer. All of the men on the rig, excepting the Johnston man—I am referring now to formation tests and not to shut-off tests—would probably be company men. The part these com- [fol. 543] pany men, including myself, take in making the tests is that we watch the test, observe the blow, and use our judgment as to when we believe the test will be conclusive. If we think that the results will be satisfactory, that the blow has been indicative enough, that sufficient cognate fluid or gas has entered, we will say that that has been enough and we will start pulling the drill pipe and tester out of the hole. Our company crews run the machinery and make up the pipe to lower this apparatus into the well. The oil company's men set the packer under the supervision of the Johnston man. The company's men and the Johnston man cooperate in doing this work, in setting the packer. I think all of the actual physical steps that are taken at the top of the well, that is, the manual steps, are taken by the company's men, but the mental steps are taken cooperatively by the company men with the Johnston man.

The company or the contractor, as the case may be, furnishes the drill pipe. Johnston furnishes nothing except the tester, and perhaps a sub joint used in connecting the drill pipe to the tester. Of course, the tester includes the

packer, and occasionally the tail piece. But the Johnston Company does not furnish the drill pipe or any of the equipment that is used to lower and raise pipe in and out of the well or any of that equipment. I think that these testers that are lowered down on the drill pipe, with a valve on them, that can entrap samples and bring them out, instead of setting a string of pipe and bailing or swabbing, saves a lot of money for the oil companies. The Standard Oil Company has adopted that quite generally.

[fol. 544] I am acquainted with Mr. Linville, but I don't know Mr. Bivens. Mr. Linville was not the representative of the Johnston Company who participated in these tests on many of the wells that I have referred to with the Johnston Tool. I think there was only one test he was present on, or two at the very most. He was not stationed in the northern district at the time. I don't recall that Mr. Bivens was on any of the tests. I do recognize Mr. Linville as having been on at least one testing job performed for the Standard Oil Company of California.

Redirect examination.

By Mr. Wright:

I testified that the spring was used to hold the valve seated or closed. It does of necessity hold the valve closed while coming out of the well as well as going into the well. If you remove the spring from the main valve and endeavor to raise the device from the well, after you had overcome the hydrostatic head, it would probably mean that the valve would open. There would be a hydrostatic pressure upward on the packer after you came out of the hole. I believe that hydrostatic pressure operating upon the packer would be sufficient to raise that lower member up off of the valve so that it would open, if the spring was left off. If the spring was removed, the main valve would open of its own accord when the device was lowered into the well.

The Court: It would what?

A. It would open running in the hole of its own accord because the drill pipe would be empty, so that a certain buoyancy would be applied to it, and it would have to overcome the hydrostatic head going down, and that would be sufficient to open the main valve.

Q. Then, it won't have any tendency toward either opening or closing the valve, will it?

A. If you had say only a hundred feet of fluid in that drill pipe, you would not have sufficient weight inside of there to help you; but, if you had a normal amount of fluid in the drill pipe, it would do so.

Q. The deeper the well the more the hydrostatic pressure? That is all the difference that makes, isn't it? It doesn't [fol. 548] make any difference in the direction the hydrostatic pressure is exerting itself, is that right?

A. That is right.

Q. Now, where do you get any force as you are coming out of the well due to hydrostatic pressure that tends to either open or close the valve?

A. Why shouldn't you get a force tending to open it?

Q. Do you think it would tend to open it?

A. I believe it would.

Q. Are you sure about that or is that without having had a chance to fully consider it? You said a moment ago that the packer would not tend to either lag behind or speed up as compared with the drill pipe. Now, in order to open the valve, it has got to tend to go faster than the drill pipe, as the parts are slideable one on the other? That is correct, isn't it?

A. Yes.

Q. You don't really think there is anything while you are coming out of that well that causes that packer to tend to speed up faster than the drill pipe, do you?

A. We have a certain amount of fluid in the drill pipe that is exerting a certain weight down as we are pulling out. We have pressure, due to fluid pressure, exerting pressure against the packer. Now, why couldn't that open the valve?

Q. The fluid pressure on that packer and all the parts in there is the same from all directions, isn't it?

A. Yes.

[fol. 549] Q. Then, the only force that could change that would be due to the lifting of the pipe going out of the hole, the movement up the well, which would give you an added force, isn't that correct?

A. Which would tend to open the valve.

Q. That would tend to push the packer down the well, wouldn't it?

A. Yes.

Q. And when you push that packer down the well you are doing just what the spring does? It would tend to keep the valve closed, if you will stop and think a minute, isn't that right?

A. I don't see it.

Q. What does the spring do on that main valve? It tends to push the packer down the hole, doesn't it? You had better check it up. This spring tends to push this packer down the hole and to push this valve seat down against the valve head to close the valve?

A. Yes.

Q. Then, the force that we are talking about, that is exerted when the tool is being pulled out of the well, pushes that packer down and tends to close the valve, doesn't it, and not open it?

A. The spring tends to keep it closed.

Q. Any force that tends to push the packer down the well tends to close the valve, doesn't it. Isn't that true?

A. I don't know.

[fol. 550] Frank D. Gess, called as a witness on behalf of defendants, being first duly sworn, testified as follows:

Direct examination.

By Mr. Wright:

My name is Frank D. Gess. I reside in Bakersfield, California, and I am by occupation a drilling foreman. I am now employed by the Union Oil Company and have been engaged by that company as a drilling foreman since 1932, and prior to that time as a driller. I have been engaged in or connected with the oil drilling business continuously since 1917. I have during the period of my occupation in the drilling business had occasion to learn of quite a number of various devices used in the drilling of oil wells, and have become familiar with them. I have become familiar with the conditions which are met with in the drilling of an oil well, especially a rotary drilled oil well.

My attention is called to Plaintiffs' Exhibit 9. I have examined and inspected that device and have become familiar with its members and parts. I have also examined the drawings of the tool.

[fol. 545] Q. If it overcame the hydrostatic head, would it open?

A. You see, you have a packer here that is quite a large packer and you have empty drill pipe. If you can imagine taking a long glass tube that is empty, or if you would have your finger on it and have it full of air, it would require some force to force it down into water; and to overcome that force it would be sufficient to open that main valve and allow the fluid to enter the drill stem.

By Mr. Wright:

Q. Have you ever run the main valve without the spring and observed exactly what you have stated to the court?

A. Yes; we have.

Recross-examination.

By Mr. Lyon:

That spring is actually to keep the main valve closed coming out of the hole. Under normal conditions, if it keeps the valve closed coming out it will keep it closed going in.

Q. Will you explain what you mean by this hydrostatic pressure tending to open the valve against the force of this spring?

A. Did I say against the force of the spring or without the spring?

Mr. Morgan: He said without the spring.

By Mr. L. S. Lyon:

Q. It is bucking the spring?

A. It is bucking the spring but the particular instance that I had reference to was without a spring.

Q. You think that the hydrostatic pressure, either going in or out of the well, would open the valve if it wasn't for the spring, do you?

A. I know that it would.

[fol. 546] Q. In both cases?

A. I know that going in without a spring the valve would open.

Q. Where does it exert the pressure to open the valve?

A. It would probably exert the pressure on the packer the same as if you were seating the packer?

Q. Hydrostatic pressure is effective in all directions, isn't it?

A. Yes, sir.

Q. Which way is it going to move that packer? Is it going to move it up or down or sideways?

A. It is going to resist the passage of the packer.

Q. It is also going to be on top of the packer, isn't it?

A. That is right except that you have drill pipe empty and you have a certain buoyancy being applied by that fluid. You are overcoming that.

Q. Wait a minute. The packer is not in the drill pipe, is it?

A. The packer is on the drill pipe and is attached to it.

Q. This hydrostatic pressure that could apply to the packer is going to apply from all directions, isn't it?

A. Equally in all directions.

Q. How is that going to tend to move the packer in any particular way?

A. Because you are overcoming the buoyancy of the dry drill pipe by forcing it into fluid.

Q. Then, it is the fact of lowering the device that would cause the pressure to build up against the packer and let the packer unit slide so that the valve would open?

A. That the main valve would open.

[fol. 547] Q. And this spring is on there to keep that shut?

A. The spring is on there to help keep it closed.

Q. Coming out of the well which way does the hydrostatic pressure act on the packer?

A. The same way. It is pushing up on it just as well as it is in all directions.

Q. You are pulling the pipe out at this time? You are pulling it out, aren't you?

A. If you had a packer that took up the full diameter of the hole, you would have such a condition. However, you do not run a packer in a hole that takes up the full diameter of the hole.

Q. What is this by-pass in the packer for?

A. The by-pass in the packer is to equalize the pressure above and below the packer.

Q. If you have the pressure above and below the packer equalized as you pull out of the well, isn't the packer going to drag or is it going to tend to jump faster than the drill pipe?

A. It is just going to come right along with it.

"Q. Will you state whether or not in your opinion that device is a practical, operative device for the purpose of obtaining a sample from a well?

Mr. L. S. Lyon: I object to that, your Honor, for the reasons that have heretofore been stated and also on the ground there is no foundation laid here.

The Court: I think the witness may describe the operation of it, but it doesn't seem to me that to record an opinion [fol. 551] as to its practicability would be particularly responsive to the issues.

The Court: Objection sustained.

Mr. Wright: May we have an exception, your Honor?

The Court: Yes.

By Mr. Wright:

Q. Will you state whether or not you believe that that device, if used in a well containing drilling fluid, would or would not leak?

Mr. L. S. Lyon: I object to that, on the ground that there is no foundation laid. The witness has not shown that he has had any experience with such a device at all or made any trials with it or ever saw it operated, and I think his answer would be nothing more than what his own name implies in this case.

The Court: Well, he says he is a driller. A driller knows all about not only drilling the well but how to get it out of trouble, doesn't he?

Mr. L. S. Lyon: I think they think they do, but whether they would know whether a tool would leak or not, just from looking at it on the courtroom floor, I don't know.

The Court: But it seems to me to be subject to the same comment that I made before, that is, it calls for his opinion when he hasn't been qualified as one competent to give an opinion. But I see no objection to your asking him if he has operated one of the tools."

I have run testing devices in oil wells. I have run the Johnston and the Halliburton and the Benjamin Franklin testers.

The Court: The what?

[fol. 552] A. The Benjamin Franklin.

By Mr. Wright:

Q. The Halliburton device that you referred to, was that the "J" tool?

A. That was the "J" tool, yes.

Q. And not this device which is Exhibit 9?

A. No. That is right.

From my observation of Plaintiffs' Exhibit 9 and also from my inspection and study of the drawings, I know how the Simmons device works. The Simmons device is operated on the bottom of a string of drill pipe. You set the packer by turning it to the left, and you open the valve by turning it to the right. The number of turns of the drill pipe it would take at the top of the well to turn that valve on at the bottom of the well would depend on the depth of the well and the spring of the drill pipe. In a well 5,000 feet deep I would say it would take—it wouldn't be safe under one full turn of the drill pipe to open it; and the same amount to close it. There is a chance of the too' rotating going into the hole, depending upon the conditions found in the well. This is caused by irregularity of the formation. The hydrostatic pressure which would exist in a hole 5,000 feet in depth would be different in different fields. It would be almost impossible for me to state. It varies with the fields and the weight of the mud.

The purpose of making a test in a well is to obtain samples from the formation, and from these samples you determine what your course of drilling will be or whether or not you should set casing. Oftentimes we have made tests that we thought were O.K., and there is a possibility, I should say, of making a test, and thinking it would be O.K., which it would not be. I have had that actual experi- [fol. 553] ence. Relying on the test, we went to the expense of setting a string of casing. It is necessary in most all cases to be able to maintain or re-establish circulation in devices used in oil wells. We never like to run any kind of a tool in a hole that we cannot establish circulation through near the end of the string of drill pipe. In case of blow-outs, or if you are extracting something out of the hole that should become fouled or lodged, the pump pressure will give you a better chance to free it. In my testimony that I have just given I am assuming a condition where the device is not resting upon a shoulder or firmly attached to the bottom of the hole, but is coming out of the hole. From

my examination of Plaintiffs' Exhibit 9, my opinion would be that if you—on a deep hole, if you attempted to run that tool you would have to set your tool so close together that, to turn your drill pipe—you have got to turn your drill pipe to open it—that you would probably, on a shoulder, in formation, with the packer setting on a shoulder, in all probability you would rotate your packer on your seat, which would probably destroy the seat and you wouldn't be able to get a test on a deep hole. If the valve members were set loosely enough to obtain a sufficient freedom of movement so they would not stick, I believe you would get a leak there, a leak between the plates, I believe, would take place. I do not believe that that tool, Plaintiffs' Exhibit 9, would under normal conditions makes a satisfactory test.

I have never been in the employ of the defendant company, either the Honolulu Company or the M. O. Johnston Company. I was not hired by them to come here as a witness.

[fol. 554] Cross-examination.

By Mr. L. S. Lyon:

Plaintiffs' Exhibit 9 might possibly work at 4,000 feet. It would be a question whether the tool would work there. The tool is questionable, whether it would make a test or not. It might work at 2,000 feet. The tool would probably make a test O. K. in a shallow hole for a shoe test through casing, where you haven't much chance of any obstacles turning the packer and causing the tool to open up; but running it out in the open formation, in my opinion, it wouldn't be practical at all.

Q. Would there be any difficulty about the open formation if you followed the practice that the previous witnesses referred to of running a reamer to true up the hole?

A. That is true. It is done. But oftentimes the hole will slough on your round trip out of the hole.

The Court: Will do what?

A. Will slough off the hole and cause the tool to hit.

By Mr. L. S. Lyon:

Q. But if you have got a good hole you might run it all right.

A. Well, no walls of any hole are absolutely perfect; we know that.

I do not make the positive statement that this tool could not be operated. It might possibly be operated. You would have to have the best conditions. I said it might operate in casing, in shallow holes, in all probability the packer would work. I understand there is supposed to be a valve on there. The design of the valve is not the only problem with the tool. I don't like the possibility of the tool opening up going in the hole. You would have to study the tool in order to be able to fit that. I couldn't tell you how [fol. 555] to do it right now, but it might be done. You could probably figure out a better valve.

Q. I am not quite sure that I understand this opinion that you have given. Is it your opinion that it is going to be too hard to turn that tool, or that it is going to turn too easy.

A. To open the tool, you mean?

Q. Yes, to open the tool. Is it going to turn too hard or too easy?

A. Under pressure, if you are running it deep, you understand, my opinion is that you would have to set the tool up, place it up so tight that probably you would have difficulty in opening it, and in attempting to open it you would probably turn your packer on the seat.

Q. That wouldn't happen if you didn't set it up too tight?

A. No, it wouldn't.

I don't know whether any grease is being used on this valve. I don't see why there couldn't be. Of course I imagine it would be properly greased.

Q. You are used to using these high pressure valves, aren't you, like the Nordstrom valve?

A. Yes.

Q. That stands terriffic pressures with the valve off the seat without leaking, does it not?

A. Yes.

Q. Due to a film of grease?

A. Yes.

[fol. 556] Q. Is there any reason why you couldn't put a film of grease on this valve?

A. Well, the Nordstrom valve, in that you are closing the ports by turning the core completely past the ports. It is a cone-shaped core. It isn't the same as that at all. It wouldn't be a comparison, in my mind.

Q. But you naturally, if you were going to use this device, would put grease on the valve, wouldn't you?

A. Probably we would, yes.

Q. And you could turn it then, couldn't you?

A. You could, yes, you could turn it.

I have never tried to operate Plaintiffs' Exhibit 9.

Henry T. Dear, called as a witness on behalf of the defendants, being first duly sworn, testified as follows:

Direct examination.

By Mr. Boyken:

My name is Henry T. Dear. I reside in Bakersfield, California, and am by occupation division manager for the M. O. Johnston Oil Field Service Company. I have been employed by the Johnston Company since July, 1933. I am familiar with the operation of the Johnston testing device and have seen these Johnston devices operated approximately 1500 times.

I entered the oilfields in 1918 as a roughneck on a rig, until November, 1919, at which time I started drilling, and was continually employed as a driller up until April, 1930. From April, 1930, until July of 1933 I was drilling super-[fol. 557]intendent and an independent operator in the Long Beach area.

Surface water is classed as any water that you might encounter as you drill down, until such a time as you would strike a productive sand, and it might be an artesian flow or fresh water of that nature. It does not necessarily mean that the water is on the surface. As to how far water may be below the surface and still be properly termed "surface water", that would depend upon the structure of the field. In some places water is classed as surface water as deep as 3,000 feet, owing to the nature of the construction of the formation.

I have attempted to operate the Johnston tool without the trip valve, but the operations were not successful. In holes where we had tool joints that didn't have a clear passage through them, and I have in mind the Doheny Stone drill pipe, which is flush joint drill pipe and has somewhat square

shoulders inside. I never conducted one of those tests under my supervision, but I have run a considerable number of tests where the trip valve was improperly seated, that is, the seat ball wasn't ground in on the seat, and in going in the hole strike obstructions where we open the main valve, and this fluid would leak by the trip valve and cut it out, and we would be unable to open the trip valve, and on removing it from the hole we would find that the trip valve had not opened, but the fluid had cut by the seat. One of these instances was where Doheny Stone drill pipe was used. I have drilled with Doheny Stone drill stem for two years. It is called flush joint drill stem. That is, it has no collar on the outside of the drill stem, and the threads are on the in- [fol. 558] side. Those are connected with pins; you have a pin up and a pin down, and you have a square shoulder that your rod would hit as your rod drops through this drill stem. That is to say, there are projections on the inside of the drill pipe. The go-devil travels at a considerable rate of speed, and it would encounter one of these projections and it would become crooked, and therefore would not follow on down with enough force to trip the valve. For this reason we dispensed with the trip valve in connection with this Doheny Stone drill pipe.

As to the other instances that I mentioned, where the trip valve cut out, some of these tests were made by me. The reason the trip valve did not operate was because, as the packer traveled in the hole, it would strike obstructions and open the main valve. That would throw the pressure of the fluid against the trip valve, and, it not being properly seated or possible to be closed against any substance that might have been in there, to keep it from getting a positive seal, this fluid would leak by the trip valve and get in the chamber above the trip valve as it was being lowered in the hole.

The Court: Would get in the chamber above the trip valve?

A. Yes.

The Court: I thought it leaked down from above.

A. It came from below the trip valve, past the bottom seat. That was a defective trip valve. I did not obtain a test where the trip valve did not seat properly. I explain the cooperation between the trip valve and the main valve on the Johnston tool as follows: The main valve entraps

the sample as the drill pipe is moved from the hole. The [fol. 559] trip valve opens and allows the sample to flow into the drill pipe. In other words, as you go in the hole the main valve can open and close as many times as you would strike an object to cause it to open, and it would have no effect on fluid entering the drill pipe, because the trip valve, its function is to keep fluid from entering the drill pipe from below while going in the hole. It would make no difference in the operation of the Johnston tool if the main valve opened and closed while the tool was being lowered into the well. I would not consider that the Johnston tool was an operative commercial tool without the trip valve. The Johnston Company tests oil wells for various oil companies in California. I have never successfully made any tests for oil companies without the trip valve inserted in the Johnston tool. No tests were made without the use of the trip valve, to my personal knowledge. I have testified there were about 1500 made in my division. I am familiar with the operation of the giant spring in the Johnston device. The purpose of that spring is to close and keep the main valve closed while coming out of the hole with an entrapped sample. If we didn't keep the main valve closed while coming out of the hole—to allow the fluid to enter—it would destroy the sample.

The Court: Right there. The sample, however, is not secured by the trip valve from the intermixture with other fluids, is it?

A. No, your Honor. But if we were running a test and it indicated that there was no flow in the well, and if we came out of the hole and there had been a lot of drilling fluid enter the pipe that we couldn't account for, it would make the [fol. 560] test inconclusive, because we couldn't explain where all this mud came from.

The main valve of the Johnston device is attached to two members. The seat of this valve is on a movable member, and this movable member is in turn attached to the packer below, and when you pull off the seat if you don't have this giant spring there to assist in snapping the valve shut and keeping it shut, the rebound from pulling that packer off of the seat would again open your main valve, thereby letting the fluid enter, and once it started to enter, that hydrostatic head, it would possibly cut the valve out, and wouldn't close until such time as it was practically equalized. In

withdrawing the tool from the well, in normal operation, never over 90 feet of pipe is taken off at a time. Such section of pipe is called a stand, and is approximately 90 feet. In taking off the first 90 feet of pipe in withdrawing from the well the main portion of the pipe moves downward. The reason for this downward movement is that this pipe is caught and held at the rotary table by means of slips. These slips seat around the pipe and against the rotary table, and in seating these slips the drill stem will hardly ever be found to hang perfectly in the center of the table, and it is impossible to set these slips without lowering the drill stem back some in the well. Without the spring on there, we would be pushing down with this packer, and that would in turn shove the seat away from the stem of the valve, you might say, thereby allowing the fluid to enter. If that occurred it would let an undetermined amount of fluid come in from the bottom, which would make the test not conclusive, because you wouldn't know how much you obtained from the formation [fol. 561] or how much you might have gotten in while coming out of the hole.

Upon opening this main valve we apply weight by lowering the drill stem and it takes, normally, from fourteen to twenty thousand pounds to press the spring downward and upon the main valve, and when you get ready to close it you begin lifting this weight off of the spring. That, naturally, takes place at the surface. And when you get a certain amount of weight off of that, that is, if you remove the weight to the point where this spring will overcome that weight that you have on it, it will snap this drill stem up and cause the valve to close.

The Johnston tool is always operated with this main spring in it. At times the trip valve is located at some distance from the Johnston tool. This is done in the formation testing where the hole is at such a great depth that they are afraid that the pressure might collapse the dry drill stem. For that reason they put a certain amount of fluid on the inside of the drill stem. And, in order for us to trip this valve, we place this valve above this fluid and this fluid that we put in there is in between the main valve and the trip valve. Normally the trip valve in a Johnston tool is close to the remaining parts of the Johnston testing tool. It is only on certain occasions that the trip valve is removed from the remaining portions of the Johnston testing tool. There are only two occasions for that, as I said, the one

Q. You mean you were never present when one was run?

A. No.

[fol. 573] M. O. Johnston, called as a witness on behalf of defendants, being first duly sworn, testified as follows:

Direct examination.

By Mr. Morgan:

My name is M. O. Johnston. I reside at 1559 Grand View, Glendale, California. I am president of the M. O. Johnston Oil Field Service Corporation, one of the defendants in this case. This corporation defendant was organized in June, 1933. I came to California in May of 1930, and since that time I have been engaged in the testing business. During that period I have done formation and shoe testing. The type of tester I have used is the so-called Johnston tester which is shown here in the court room. I am the owner of a patent upon that device. The portion of the device to which I refer is the equalizing valve.

The letter which you call to my attention, directed to the M. O. Johnston Oil Field Service Corporation, dated February 9, 1934, bears the signature of myself and Frank O'Neill. Frank O'Neill is secretary and treasurer of my company. The signature on the letter is my personal signature, and not as president of the company. The approval is by Mr. O'Neill as secretary of the company.

(The letter last referred to was offered and received in evidence as Defendants' Exhibit O.)

You have called my attention to a contract dated February 9, 1934, purporting to be between the Johnston Formation Testing Corporation, Ltd., a California corporation, [fol. 574] Gilson M. Jones and F. C. Van Deinse, as parties of the first part, and Mordica O. Johnston, party of the second part. I am familiar with the signatures to that agreement. Those signatures are the signatures of F. C. Van Deinse, Marie L. Rickert, Gilson M. Jones and then F. C. Van Deinse and my signature, M. O. Johnston, as an individual. The upper signature, John-

ston Formation Testing Corporation is signed for the company by Mr. F. C. Van Deinse as president. He was at that time president of that company.

(The contract last referred to was offered and received in evidence as Defendants' Exhibit P.)

The Mordica O. Johnston mentioned in that agreement just introduced in evidence refers to myself.

I am famliiar with this agreement that has been handed me, which is dated February 25, 1935, and purporting to be signed by the Johnston Formation Testing Company, with the seal of that corporation, this letter or agreement being directed to me, and bears the signatures of the parties thereto. In the left-hand corner are the words, "Approved and agreed to: M. O. Johnston", which is my signature. The signatures of Van Deinse and Jones as president and treasurer, respectively, of the company are those of Van Deinse and Jones, who were at that time president and treasurer, respectively, of the corporation.

(The agreement last above referred to was offered and received in evidence as Defendants' Exhibit Q.)

[fol. 575] (Letters Patent No. 1,901,813 offered and received in evidence as Defendants' Exhibit R, subject to motion by the plaintiffs to strike.)

(Book of Exhibits, p. 448.)

(Letters Patent No. 1,842,270 offered and received in evidence as Defendants' Exhibit S, subject to motion by the plaintiffs to strike.)

(Book of Exhibits, p. 454.)

The document which you show me, entitled, "Contract," and purporting to recite that it is a contract between the Johnston Formation Testing Corporation, a corporation, organized under the laws of the State of Delaware, and the M. O. Johnston Oil Field Service Corporation, the defendant here, was made up in duplicate. Referring to the signature which appears at the end of this contract, Johnston Formation Testing Corporation, by E. C. Johnston, President, that is the signature of my brother, who is president of that company. The copy of this agreement is unsigned on the part of the M. O. Johnston Oil Field Service Corporation. I am sure that I signed the dupli-

cate of this agreement and forwarded it on to the other company in Texas, and that this copy which I now hold was then received by me from that corporation in Texas, bearing the signature of E. C. Johnston, as president.

(Defendants' Exhibit T for Identification.)

[fol. 576] (Patent No. 1,709,940, patented April 23, 1929, was offered and received in evidence as Defendants' Exhibit U.)

(Book of Exhibits, p. 460.)

My attention being called to patent No. 1,790,424, the date of issuance of said patent being January 27, 1931, I state that I am familiar with that patent. I have seen that patent several times, the disclosures there. There are points of difference between the device shown in this patent No. 1,790,424 and the Johnston device which has been shown here in the court room, the points of difference being that there is no equalizing valve and no trip valve shown in the patent, and the spring and the main valve shown in the patent is below the packer, while the main valve in the tool here in the court room is above the packer.

(Patent No. 1,790,424 was offered and received in evidence as Defendants' Exhibit V.)

(Book of Exhibits, p. 466.)

Mr. L. S. Lyon: Those patents, your Honor, were issued, one of them to E. C. Johnston and one of them to an Arkansas corporation, and I want my objection to go to the fact, in addition to the objections I have already made, that there is nothing extending from E. C. Johnston or the Arkansas corporation to the defendants in this case, no rights under these patents established.

The Court: Are these patents mentioned in the pleading?

[fol. 577] Mr. L. S. Lyon: No, your Honor.

Mr. Morgan: I don't know. I will ask Mr. Wright.

Mr. Wright: It isn't.

The Court: Then what is their importance in the case?

Mr. Morgan: We claim, if your Honor please, that we are operating a device under a patent that has been issued. Now, as we see it, it doesn't make much difference whether we are using that device rightfully or wrong-

fully under a valid license agreement or how we are using it, so long as we are using a device which has been patented by someone other than the plaintiff in this particular action. And when we can show the connection between the device introduced in evidence and the device which has been described in the patent we feel that we have brought ourselves within that particular rule. We claim that the Johnston patent is a new and distinct invention. I have a case here, if your Honor please, which my associate has just called to my attention, the case of Corning et al. v. Burden, 14 Law Ed. 683.

As to Defendants' Exhibit T for Identification, which I have heretofore identified as the agreement entered into by and between my company and the Johnston Formation Testing Corporation, of which E. C. Johnston is president, I will state that there was a modification of that agreement entered into later. This letter which you show me, dated August 10, 1934, is the modification that I have referred to. The signature, M. O. Johnston Oil Field Service Corporation, by M. O. Johnston, President, is my signature; and the signature of Johnston Formation Testing Corporation, by E. C. Johnston and F. D. G. Park, [fol. 578] are the signatures of E. C. Johnston and F. D. G. Park, respectively.

(The letter last above referred to was offered and received in evidence as Defendants' Exhibit W.)

(The agreement previously marked Exhibit T for Identification was received in evidence as Defendants' Exhibit T.)

The document which has been handed me, and which is termed a license agreement, purporting to have been executed on the 1st day of April, 1935, is signed by E. C. Johnston, Blaine Johnston and J. L. Johnston, whose signatures are appended to that agreement. The Johnston Brothers Valve Corporation is a co-partnership. The name "M. O. Johnston Oil Field Service Corporation By M. O. Johnston, President," is my signature, and the seal thereon is the seal of the corporation.

(The license agreement last referred to was offered and received in evidence as Defendants' Exhibit X.)

As to the contract or letter, dated February 9, 1934, which purports to be addressed to the M. O. Johnston

the hydrostatic head of fluid. The tendency of that with respect to the valve here would be that it would force the fluid in between those openings and cut out the seat. In case of a leak the test would be negative or not conclusive. The torque in the pipe would affect the successful operation of the device. The twisting of the pipe in the distance between the top of the well hole and where the tool is would make it necessary at times to turn the pipe more at the top [fol. 565] of the well than the actual turn which is accomplished where the tool is located, because that turn at the top is not always transmitted directly to the bottom because you have a certain amount of friction in the well. You might say at any considerable depth it is not good practice, not considered good practice in the drilling industry to put very much of a strain on a drill stem when it is dry, that is, it is figured closely as to its collapsible strength or for pressure, and any great amount of twist in it might cause the drill stem to collapse. That twisting would be liable to occur with the use of the Simmons tool, Exhibit No. 9, and that would occur in either opening or closing. You have to rotate it to open it and rotate it in the opposite direction to close it.

The first form of testing tool that I ever heard of was the Johnston device. That was in about August, 1930, when Mr. Johnston contacted me in Long Beach in regard to running it on a test when I was superintendent for the James Oil Company.

Cross-Examination.

By Mr. L. S. Lyon:

If the trip valve in the Johnston device leaks and lets a substantial amount of drilling fluid into the pipe up above the trip valve, you are not able to open the valve when you drop the go-devil, because the go-devil won't travel through this fluid with sufficient force to trip this valve. The leaking of the trip valve caused the failures to get the tests by the Johnston tools, that I observed. The trip valve would open going in the hole and let in a great amount of fluid. As the main valve would open the fluid would travel up through the trip valve.

[fol. 566] Q. Then, if that trip valve leaks at all, instead of doing any good it does a lot of harm in the Johnston tool, is that right?

A. It proves to the operator——

Q. Just answer that question, will you, please, yes or not?

A. You say, if it leaks, it causes harm?

Q. Instead of good.

A. I couldn't say it causes harm; no.

Q. It prevents you from completing the operation, does it not?

A. It prevents you from getting a non-conclusive test. If I may explain it,——

Q. I don't want any explanation.

Mr. Boyken: May he explain it, your Honor?

The Court: Let him explain.

Mr. L. S. Lyon: If your Honor please, I have a right to cross-examine the witness.

The Court: If the witness wants to make an explanation, let him make it. Make your explanation, whatever it is.

A. I meant by non-conclusive that we would get an undetermined amount of fluid in as we went in the hole.

By Mr. L. S. Lyon:

Q. If you are unable to open this trip valve when you drop the go-devil, are you able to make a successful test with the Johnston tool?

A. No.

Q. And, if the trip valve leaks, you can't open the trip valve with the go-devil, can you?

A. No.

[fol. 567] By the Court:

Q. Just why?

A. Because this rod that we drop to open the trip valve, your Honor, won't travel through this fluid.

Q. The fluid that comes in through the leak, is that the idea?

A. Yes.

Where we are testing in these 7,000-foot wells or deeper and have to put in say a thousand feet of fluid to prevent the pipe from collapsing it is put in below the trip valve, and held there between the main valve and the trip valve. It is held from traveling up in the drill stem by the trip valve.

we didn't get but two gallons in the tool, the companies would not accept it as a conclusive test because they figure the amount of fluid that is below the packer and at the point where it is cleaned out, and they expect to get normally about that amount of fluid in the testing device where we run it. When we run this trip valve about a thousand feet from the tester and fill in with mud fluid we still have all the remaining 6,000 or more feet above the trip valve empty. The reason why we don't fill the drill pipe clear to the top is because we don't want to put that much weight on the formation. You wouldn't have any room for your sample. In other words, if we had that height of a column of fluid in the test tube, it would hold back the flow of fluid from the formation; it would retard it. The reason why we don't always put a thousand feet or so of mud fluid in the test tube, and only do that when we have a 7,000-foot well or deeper, is that the operator doesn't consider it necessary to put fluid in there only, as I said before, as a precaution against collapse of the drill stem. It is better not to have it if you don't need it, because it would just take the additional time of filling up that drill stem, and also it would put some pressure on the formation.

In arriving at my opinion about whether this Simmons valve would work or not, my testimony has to do only with the fact that you have to turn one part of the valve [fol. 571] against the other, with the weight on it. As to whether I find anything else wrong with the Simmons apparatus, as a safety factor I would not consider it safe to run in a well where you might encounter a high gas pressure or a high flow of water or oil. I wouldn't testify and say positively that it would be impossible to take the Simmons device and make a test with it. It might be able to be run; but I testified I didn't think it was practical.

Q. In testifying that you thought you would have too much difficulty in turning the valve did you contemplate that the valve would have any grease on it or would be dry?

A. I think that would have very little to do with it.

Q. Which way did you contemplate it? Which way have you in mind the valve shall be in giving your testimony?

A. Either dry or with grease.

Q. Your testimony applies in either case, does it? It doesn't make any difference whether there is any grease on it or not?

A. Yes.

Q. Would it turn easier with grease?

A. It would possibly turn easier with grease but my belief is with that amount of weight necessary to seat this packer it would be such a great amount of weight that the grease would not relieve the friction on it.

Q. How much weight would you say was required to seat the packer?

A. Normally, we give them about eight points on a weight indicator.

[fol. 572] Q. How much is that in pounds?

A. That depends on the number of lines but, normally, I would say twelve to fourteen thousand to twenty thousand pounds. It all depends on the depth.

Q. Have you any experience or knowledge as to how much pressure a film of oil or grease can withstand?

A. No; not figuratively speaking but from a practical standpoint I have an idea of what effect grease will have on two objects when placed together.

Q. Your testimony or criticism of this Simmons device is that you don't think it is as good as some later forms rather than a statement that you know that you couldn't make a test with it, is that correct?

A. I, naturally, don't think it is as good as any of the later forms. But, as I recall the testimony that I gave, I didn't think it could be operated as a commercial device.

Q. What do you mean by a commercial device? Do you mean in competition with the later improved types?

A. No. That refers to the question that you objected to when I stated that I didn't think it would be accepted by the operators.

Q. You don't testify that it cannot be operated, though? You won't make the positive statement that it can't be operated, will you?

A. That statement you couldn't make, Mr. Lyon, because to say positively nothing would operate in a well would be covering quite a broad field.

Q. And you have never seen one operated or attempted to be operated, have you?

A. I never heard of but one and Mr. Halliburton testified he saw one run.

Oil Field Service Corporation, and bears the signature "M. O. Johnston," I will state that that is my signature, and the signature, "Frank E. O'Neill, Secretary," is the signature of Frank E. O'Neill, who was secretary of the corporation at that time, and the seal on said document is the seal of the corporation.

Mr. Morgan: We offer this agreement in evidence, if your Honor pleases.

[fol. 579] The Clerk: That is already in evidence as Defendants' Exhibit O.

(Patent No. 1,715,504, issued June 4, 1929, was offered and received in evidence as Defendants' Exhibit Y.)

(Book of Exhibits, p. 473.)

Cross-examination.

By Mr. L. S. Lyon:

As far as I know, I have produced here all of the agreements between the defendant M. O. Johnston Oil Field Service Corporation and the Johnston Formation Testing Corporation in the Texas case, having to do with the relations between these two companies so far as the operations under the patents that have been offered here in evidence are concerned. There are no other agreements existing between the two companies. I think the agreement relating to Exhibits U and V provide that it shall terminate on a judgment being rendered in favor of Mr. Halliburton in the Texas case.

Q. You no longer hold that license, the defendant no longer has that right; is that right?

A. Well, I haven't been advised of such by my attorneys. I depend on them for that.

Q. Well, what I am trying to find out is whether that agreement has been terminated or has not been terminated.

A. I couldn't answer that.

Q. Are you paying any royalties under that agreement?

A. I have been, yes, sir.

Q. When did you last pay them?

A. I really couldn't say.

[fol. 580] Q. You are the president of this corporation, aren't you?

A. Yes, sir.

Q. And you knew that you were going to testify about this matter, didn't you, about these license agreements?

A. I didn't know that.

Q. Do you authorize the payments? Do you review them before they are made?

A. I have a bookkeeper and a secretary. Those things are made out and I sign the checks. I usually look them over.

Q. When did you last sign a check for payment of royalty under that agreement?

A. I don't know.

Q. When do you know of last signing one?

A. I am not sure.

Q. As near as you can be, when, according to your best recollection, is the date you last signed a check for royalties under that agreement?

A. I don't know whether I have signed a check since that decision in the Texas court or not. I don't believe I have.

Q. There would be certainly a decision to be made by your company and yourself as to whether you were going to pay royalties under that agreement after that decision; isn't that correct?

A. Yes, there should be, but we didn't.

Q. You don't remember coming to any decision about whether you would continue to pay the royalties or not; is that correct?

A. No, I haven't. I have been too busy trying to prepare for this suit here.

[fol. 581] Q. We didn't any of us know that this suit was going to be tried up here about four weeks ago. When were you advised of the decision in the Texas case?

A. I don't know when that was.

Q. Well, do you know about when it was?

A. No. I wouldn't state.

Q. What?

A. I wouldn't state. Mr. Lyon, I pay very little attention to paper details. My business is done in testing and building up a service organization, and I leave that up to my secretary and Mr. Farrer, my attorney.

Q. You don't pay any attention to whether or not you pay royalties to your brother's company in Texas; is that right?

where they are afraid of collapsing the drill stem and the other where they are making what is known as a water shut-off test and they wish to relieve some of the strain on the drill stem and place some fluid inside of the drill stem. [fol. 562] The trip valve is usually placed up the drill pipe when the test is being made in a deep well only when it is at a depth where the operator considers there is danger of collapsing the drill stem. The depth that I have in mind is, I would say, below 7,000 feet. So, in order to prevent the drill pipe from collapsing, fluid is put in there and the valve is set above the fluid. The fluid normally put in there to prevent the drill pipe from collapsing is either drilling fluid or just clear water. Where the trip valve is set at some distance above the main valve, the Johnston device is put into operation after the packer is set by dropping an iron rod, which we commonly speak of as a go-devil, to open the trip valve. At the time the trip valve is opened, the main valve is also opened. When the trip valve is finally opened, the fluid that is put in there below it to prevent the pipe from collapsing is raised up by the sample from the formation through the trip valve and on up the drill stem. The sample is then entrapped by the main valve closing. It is not objectionable to have this fluid, which prevents the pipe from collapsing, in the pipe mingling or commingling with the fluid to be sampled. The reason why there is no objection to that is that they are very careful to know just how much fluid to place in a drill stem. I might further explain that by saying in filling this drill stem they fill it very slowly to allow any air to escape so that they will not have any air pockets in this fluid, so when they come out of the hole they can get an accurate measure of how much fluid was taken from the formation while the test was being made. This fluid comes in from below and, normally, does not mix with the fluid that you placed in before going in the hole.

[fol. 563] I am familiar with Plaintiff's Exhibit No. 9 in this case, which is the so-called original Simmons tool. I have carefully examined it here in court. In my opinion, the tool as shown in Exhibit No. 9 would not be a commercially operative testing tool. My reason for the opinion just given is that by examining the exhibit it shows you have to apply weight to seat this packer.

The Court: You have to do what?

A. You have to apply weight by means of lowering the drill stem to seat this packer against the formation, and

that would necessarily place weight on the face of this valve and, in my opinion, it would be rather hard to rotate those valves as they face there with that weight applied, and it would be somewhat uncertain if you tried to raise that weight off of it in order to open and close it. You might unseat your packer in so doing that. And, if you had it open, and tried to take part of the weight off in order to close it, and if you raised your packer up, it would allow your fluid to flow into your drill stem.

Q. I am going to hand you Defendants' Exhibit L, which is a model of the device shown in the Simmons patent, and ask you to point out with reference to this model why in your opinion it would not successfully operate.

Mr. L. S. Lyon: We make the same objection, your Honor, to all this line of testimony. This witness has no experience with this device and is not competent to testify to it. Opinion testimony of someone who has never made any tests with a device certainly cannot supersede testimony of people who actually did work the device.

The Court: The objection is overruled.

[fol. 564] Mr. L. S. Lyon: An exception.

A. It can be readily seen by this model as you apply pressure on the upper portion where the drill stem would be attached that you would cause a friction on this valve.

I mean friction between those two portions of the valve where one slides on the other. If it was stuck on there, it is my opinion you would have trouble closing the valve with that weight on there. If you would relieve the pressure so that there would not be that sticking action, it would be pretty hard to determine, in raising a drill stem in the well, whether you were just lifting enough to relieve that or whether you were lifting enough to release this packer from its seat. In order for the valve to operate you must always have the packer on its seat. If you relieved the packer from its seat, the valve could not then operate, because this bottom member has to be held stationary in order for the upper member to turn. If those two portions of the valve were somewhat separated so that they would not stick, there would be the likelihood, in my opinion, for leakage at that point. There would be pressure in the bottom of the well which would tend to force liquid of any kind in through those two portions of the valve. You would have

Q. What keeps it from going down?

A. As you travel through fluid, if you filled the drill stem full of fluid as you went in, that fluid would naturally, stay in that drill stem until you started out of the hole with the drill stem.

Q. How about at the top of the well? What keeps it from leaking out in the first part of it?

A. What prevents the drill stem from leaking?

Q. What prevents this fluid that is in the pipe before you put the trip valve in from leaking out?

A. From leaking out into the hole?

Q. Yes.

A. You have the hydrostatic head of the fluid on the outside.

Q. What prevents it before you get down far enough to create such a pressure?

A. It is the practice to have the hole full of fluid on the outside when you start to make up your tools. Your hole is always full on the outside.

[fol. 568] There is nothing to prevent the mud fluid from leaking out into the well out of the pipe below the trip valve as you go into the hole—while we are filling this drill stem with fluid—nothing only the fact that this fluid would not run out of the drill stem into the outside because you have equal pressure there.

Q. Don't you have the pressure of this main spring holding the main valve closed?

A. Unless you strike some object going in. Normally this comes in the hole, and down a short ways, that is usually spoken of as the surface string, and we wouldn't expect to encounter any objects in that. And even if the valve did open, why we would still know how much fluid came in the drill stem because we place this trip valve on top of the fluid after it is filled.

Normally, in a 7,000-foot well, it would take 14,000 pounds to collapse the spring on the main valve. I am unable to answer as to how deep down in the well the pipe would have to be to have a hydrostatic pressure that equalled 14,000 pounds. I wouldn't be able to answer that as to the figures on the hydrostatic head. In running a test that is usually figured by the engineer that is on the job representing the company that we are testing for. I don't know how far down the well you would have to be before

you would encounter a pressure that was greater than that which was represented by the power of the spring, not in actual figures. But through our experience in running the tool we have learned just about what amount of tension to put on this spring relative to the depth we plan to run it. In actual pounds we don't figure it to a fine point because a little additional tension on there wouldn't have any effect [fol. 569] on the valve trapping the sample. In running these testers we have weight indicators, and we would have to hang up going in the hole so that our weight indicator showed that we had a pressure against our packer more than the power of that spring before the main valve would open. Very often we have to spud through quite a number of tight places going in the hole. That is not what we intend shall be the condition of the hole, however. As long as I have been in the field it is a condition that you cannot overcome, that is, it is almost impossible to keep a hole in perfect condition because, even though you keep it reamed out, if you continue to drill ahead a ways, this mud will bake out or, rather, wall up the holes where as you travel down with the packer this mud will scrape off the walls and form an obstruction below the packer. I have removed the Johnston tester and found nothing in the tester except what small amount of mud fluid came from the "rat-hole". That is not uncommon, especially on a shoe test.

Q. And in that case the main valve has not opened at any time until you have set the packer, has it?

A. Well, if the main valve——

Q. Can't you answer that? In those cases you know the main valve didn't open at any time until after the packer was set?

A. Well, it couldn't enter anyway with the trip valve in there.

Q. Can you answer the question I gave you?

A. No. And you wouldn't have any way to know whether it had opened. You wouldn't have any way of checking that.

[fol. 570] The space between the main valve and the trip valve would hold a very small amount of fluid. Normally, I think two gallons will fill the space between the trip valve and the main valve. Usually in the "rat-hole" there is a greater amount of fluid than two gallons. If

Corporation, and the agreement that I have produced here in writing is the sole agreement concerning said use. I do not own any rights under those patents except the rights that are given me by virtue of this written agreement that is here in evidence. Under that agreement I am required to operate the tester in this State up to a certain minimum.

I have not read a copy of the decree entered by Judge Bryant in the Texas case. I read a letter that Judge Bryant sent out. I understand that a decree has been entered in the Texas case by Judge Bryant, and I know that the Johnston Formation Testing Corporation in Texas has been enjoined from using this device.

Q. Do you know that that decree provides that that injunction shall extend to the officers, agents, servants, employees and attorneys, or those in active concert or participating with them, referring to the Johnston Formation Testing Corporation?

A. I never figured that I was an agent; that I was operating out here under a license agreement; and I was a corporation alone; that my brothers owned no interest whatever in this corporation.

Q. But under their agreement with you they are obtaining money in the form of royalties from the business which you do, are they not?

A. Yes; I pay them royalties.

Referring to these five patents that the defendants have produced here, I contend that each one of those five [fol. 585] patents covers the Johnston tester. All five of the patents as produced are involved in that tester.

The Court: Do I understand it is the witness' position that the defendant's device is based upon all five of the patents? In other words, does your device here include something included within each of the five patents?

A. Yes, sir; it does.

Q. That is your position?

A. Yes, sir.

I do not understand that for a patent to cover a device the device must be included within the claims of the patent. I have read the claims of the first of these patents, No. 1,709,940. This is the patent that I am operating under

from the Johnston Formation Testing Corporation. That is my understanding. But there are some additions there by which I am operating under different license agreements.

Q. The question is do any of the claims of this patent No. 1,709,940 read on the Johnston Formation tester as you use it?

A. I am not qualified to answer that. I hired Mr. Abbett and Mr. Boyken to go into those patents.

Q. Claim 1 of this patent refers to a hollow cylindrical casing, and says, "The upper head of said casing being provided with a valve seat and a bore beneath the same and the lower head of said casing being provided with a stuffing box." There is no such construction as that in the Johnston tester as you use it, is there?

A. I don't know. I would have to go over to that tool and have you point those things out for me to positively answer that.

[fol. 586] Mr. L. S. Lyon: If your Honor please, it seems to me, in view of the testimony of the witness, that instead of going through all of this by cross-examination, I should now make a motion to strike these patents on the ground that the defendant has not proven that these patents cover the Johnston tester.

The Court: By the Johnston tester you are referring to the defendant's exhibit?

Mr. L. S. Lyon: Yes.

The Witness: I am not qualified to compare the claims of these patents under which I am licensed with the structure of the tool that I am using, unless I go over there, Mr. Lyon, and you point those things out as to just what you mean. Then I will be glad to answer it. Neither of these patents that I am licensed under from the Johnston Formation Testing Corporation covers the trip valve or the equalizing valve. The patents that I am licensed under by the Johnston Formation Testing Corporation cover the tester unequipped with either an equalizing valve or a trip valve. The trip valve is the subject of a separate patent issued to Blaine Johnston, J. L. Johnston and E. C. Johnston.

(The defendants withdrew objection to Plaintiff's Exhibit 5 for Identification, and the Court ordered Plaintiffs'

know because I had never run the tool but just the first time, and I was experimenting, trying to find out how to work it the best. The nut that I just referred to is the nut at the very top of Figure 1 which appears in that Figure to be within the drill pipe. The two nuts on top of the stem —you see, this block comes down on the stem and two nuts adjust it down.

By the Court:

Q. The nut is not at the top of the well, is it?
A. No, sir.

If the nut is tightened, these two parts are harder to rotate, and if it is loosened it is easier to rotate. That is the way the device shown in the patent worked. In running the tool on Mr. Pace's property we didn't have any difficulty or lose part of the device in the well hole, not on those jobs that I was on. I know nothing about any lawsuit that occurred down there. I was not present at any place where they lost a part. There was no packer lost. I wasn't present when they lost a packer.

After these three tests I sold out to Mr. Halliburton and went back to Eldorado, Arkansas. I stayed there up until the fall or early in the winter of that year, 1926. I then went to Seminole, Oklahoma, and after I left Seminole I went to South America. I went to South America in the latter part of 1927. I was away out of the States about four years, that is, from 1927 until September 23, 1931, I believe, that I landed back in New Orleans.

[fol. 596] I helped design the so-called Halliburton stop cock and gear device; I suppose that is the one you are talking about. I don't say that I designed all of it. I worked with Mr. Stoddard, though, on the drawings of it, that is, I sketched part of it off. I think that was before I went to South America. That was while I was working with Mr. Halliburton there in Duncan. I don't remember the exact time that we designed the stop cock and gear device, but it was during the time I was there in Duncan; I was there about two months or a little over.

The first test on the Pace wells, if I remember correctly, was on or about March 17, 1926. I don't remember the dates of the other two tests. There were several days between the first one and the second one and, if I remember right, quite a little longer between the second one and the

third one because they were on different wells. I believe the second one was probably about a week after the first one. I don't remember the exact period of time between the second and third ones. You see, I was working on this other stuff and trying to get other jobs, and I don't remember just how long it was before we got another test. I believe that Mr. Stoddard and I were working on this stop cock and gear device in April, the month following the first test. I think Mr. Stoddard made the drawing of that just a little while before I left out there, just a few days; not very long. Mr. Halliburton told Mr. Stoddard and I to make one with a stop cock in it or asked us if we could make one with a stop cock in it, and I went ahead then and figured out the gears and Mr. Stoddard made the drawings. And they changed it some from the way I designed it, that is, I didn't make the beveled gear on it just as it was. Mr. [fol. 597] Stoddard, when he went ahead and made the drawings, put the beveled gears on it. We were trying to make this tool in different ways. The advantage in making the so-called stop cock and gear device was that it would make it work a little smoother and a little easier but it was for the same purpose. I don't know as there was much advantage more than to make it work easier. That is what I would figure was the advantage. I mean to say that the valve would open and close easier.

Q. You wouldn't have that difficulty that you had in connection with your second job, is that right?

A. Well, now, I might not have had that difficulty on more jobs than that because I had learned a little more about adjusting the nuts.

Q. By the way, were you paid for any one of these three jobs?

Mr. L. S. Lyon: Who?

By Mr. Boyken:

Q. Were these jobs paid for?

A. Not that I know of; no, sir.

Q. You were experimenting, as I understand it, with this tool?

A. Yes, sir. I was trying to show Mr. Halliburton and everybody else that the tool would work.

A. Yes, sir; we pay a royalty to them.

Q. But you don't pay any attention to it?

A. I pay attention to them. I know they are paid. Sometimes we are behind with them.

Q. Well, I am trying to find out whether you have stopped paying them since that decision or are continuing to pay. You must know what you decided to do about that.

A. I haven't decided to do anything about that.

Q. And you don't know whether they are paid or not?

A. No, I do not.

Q. What is your present position under the terms of that contract as to whether the contract is terminated or not, as far as you are concerned?

A. I just haven't given it any thought.

Q. Whom have you paid this royalty to when you have paid it? Whom have the checks been made payable to?

A. The Johnston Formation Testing Corporation.

[fol. 582] Q. That is the defendant in the Texas case?

A. Yes, sir.

Q. And have you any interest of any kind in that company?

A. I have not, no.

Q. Have you ever owned any?

A. No, sir.

Q. Whom did you run this Johnston tester for before you came to California and founded the company out here?

A. Well, I first run the Johnston tester in Alabama.

Q. For whom?

A. For the Jaggers Oil Company.

Q. I mean did you own the business or were you working for some one of your brothers' companies?

A. I was working for the Jaggers Oil Company. They were paying me. It was the Arkansas Drilling Company's rig. We rented their rig. The Jaggers Oil Company was paying me, and I was driller and looking after it.

Q. The Arkansas Drilling Company was owned by your brother, was it?

A. Yes. At that time it was owned by two of my brothers.

Q. And you were working for them?

A. I was working for the Jaggers Oil Company. We had rented their rig.

Q. Is that the only work you did with the Johnston tester before you came to California?

A. No. I put a well down of my own in Eldorado, Arkansas, and I used the tester on that job.

I was not directly in the testing business myself before I came out here. I had run the tool on numerous oc- [fol. 583] casions, but it was just for accommodation, because oftentimes I wasn't busy, and if someone wanted a test and I happened to be there I would go out and run it. As originally built, this Johnston tester did not have any trip valve on it. I couldn't say how long the tester was operated without a trip valve. The first tool I ran was in Alabama sometime in the summer of 1927, and, as I remember that tool, it had straps on the side of it, all the way across the spring. It had no trip valve. I don't know exactly how long the Johnston tool was used before this trip valve was put on it. The Johnston tester itself was invented by my brother Edgar Johnston. He is one of the defendants in the Texas case I do not understand that my brother Luther invented the trip valve. The three of my brothers were together. The tester was invented by Edgar Johnston, and then some time later the trip valve was invented by three of my brothers together.

It is my understanding that I have no right to employ the Johnston tester here in California except as that right may be conferred on me by this license agreement that I produced here from the Johnston Formation Testing Corporation of Texas, with the explanation that that license agreement was gotten up for my corporation as a protection of our families. But personally my brothers and I have always trusted one another, and I would just as soon it had been an oral agreement. The rights in this Johnston tester are owned in Texas and the Midcontinent States by my brothers, and they conferred on me the California rights. The defendant in the Texas case is the Johnston Formation Testing Corporation and the president of that company is my brother, Edgar Johnston. Then there are other brothers who are interested in the [fol. 584] eastern company. We first had an oral agreement and it was understood between my brothers and I that I was to use the patents of the Johnston Formation Testing

Exhibit 5 for Identification admitted in evidence as Plaintiffs' Exhibit 5.

(This Exhibit is not printed, but is transmitted as a physical exhibit with the other physical exhibits in this case.)

(The letter of Judge Bryant deciding the Texas case was admitted in evidence as Plaintiffs' Exhibit 17.)

(Book of Exhibits, p. 228.)

[fol. 587] JOHN T. SIMMONS, called as a witness in behalf of plaintiffs, in rebuttal, being first duly sworn, testified as follows:

Direct examination.

By Mr. L. S. Lyon:

My name is John T. Simmons. I reside in Houston, Texas, and am 48 years of age. I am the John T. Simmons named in Letters Patent No. 1,930,987 here in suit. At the time I filed my application for this patent I lived in Eldorado, Arkansas, where I was employed in the well drilling business, supervising well drilling. I was born in Montgomery County, Texas. I had had quite a bit of experience in the oil fields prior to the time that I applied for this patent. I started in roughnecking in 1903, and I began my first drilling in 1906, and I drilled my first oil well in 1909. I was water well-drilling for a while. I have spent practically all of my life working at well drilling. I have worked on well-drilling rigs in other places than Texas; for instance, Arkansas and California. In California I have worked at Maricopa and Fellows, and since working there I drilled at Long Beach in 1925. Being asked to start in at the beginning and give an outline of what experience I have had in drilling oil wells and where, I have drilled in the States I have just mentioned, and in India, two different parts of India, and Australia; I was supervising drilling in Australia. I have drilled in South America in two different parts, eastern Venezuela and Maracaibo. I have also drilled in Oklahoma and Louisiana. I am a rotary driller as well as a cable tool driller. I have worked at both.

[fol. 588] I remember making an agreement on February 17, 1926, to turn the invention of this patent in suit over to Mr. Halliburton. After making that agreement, I conducted tests with the device of the patent while I was in Duncan, Oklahoma. At the time I made this first agreement with Mr. Halliburton I had one of the testers already made up. Exhibit 9 over here is the original tester that I had at the time I made that agreement in February, 1926, with Mr. Halliburton. I examined Plaintiffs' Exhibit 9 this morning. After I had made this agreement in February, 1926, I took this original tester to Duncan, Oklahoma. I was on three jobs with it. I ran it or supervised it on the running of three jobs. The purpose of those runs was to find out whether it would work all right or not, to see if it would operate as I had explained that it would operate. Mr. Halliburton wanted to have the valve operation of it tried out to find out if it would do what I claimed. Mr. Halliburton also wanted to find out for sure that the device was operative. I talked to Mr. Halliburton quite a bit about putting out a trial device like Plaintiffs' Exhibit 9 in a rotary well without circulation. I showed him how it would work by closing the valve and running it in the hole with a dry pipe, and how we would be able to open the valve and let the fluid in, and how the packer would seat and hold the fluid from passing downward. I do not believe that Mr. Halliburton stated that the device might freeze if there was no circulation. He didn't say that, like some of them did. There were a lot of them that thought it wasn't possible to pull it out without getting stuck.

After having manufactured this original tool, I first demonstrated this tool at the Garrett Hotel in Eldorado, Arkan- [fol. 589] sas. This was just a few days before I made the deal with Mr. Halliburton. I demonstrated this Plaintiffs' Exhibit 9 in the lobby of the Garrett Hotel in Eldorado, Arkansas, and tried to get a job to run it on. At the time I demonstrated this device in Eldorado, Arkansas, there was quite a bit of drilling going on around Eldorado, different places around Eldorado, Arkansas. Quite a good many drillers and oil men stopped and watched my demonstration of this tool in the lobby of the hotel.

When I took Plaintiffs' Exhibit 9 to Duncan, Oklahoma, I supervised it on three jobs. The wells in which it was run belonged to a man by the name of George Pace. The wells

were located between Duncan and Comanche, on the right-hand side of the road going from Duncan down to Comanche. There were present at these demonstrations, besides myself, Mr. Stoddard, and on the third job Mr. Halliburton was present. The first job was what I would call a perfect job. We opened the tool and the gas started to blow through the pipe, and we left it open for a little while, and then closed it and withdrew it from the hole, and we found about the amount of fluid in the pipe that would be in the "rat-hole", as near as we could figure, the amount of fluid that would be in the amount of "rat-hole" which we had. The second job, we opened the tool and the seat held, but there was no fluid came in. There was no air coming out of the pipe, so we said there was no fluid came in and that it was not productive sand. I suppose that it would be called a negative test. The test showed that there was nothing coming in. And the third job was a little larger gas well than the first one. It blew hard enough to blow a little of the mud, spray it out [fol. 590] through the pipe, if I remember right, but didn't blow all the mud entirely out of the pipe.

I would say that all of the three tests that I supervised were satisfactory tests. The first and third ones I would say were what I would call perfect. The other one, the middle test, the second test, was satisfactory in the sense that I determined whether or not there was any production in the formation. There was no air. We couldn't tell that there was any air coming out of the pipe, or gas, so we figured there was no fluid in the sand or nothing to come in. So that would be a satisfactory test. We could tell when we made those three tests when we had opened the valve, and could tell when we had closed it. Based on my knowledge of Exhibit 9 and my experience in running Exhibit 9 on those three Pace jobs, I will state to the Court that Plaintiffs' Exhibit 9 is an operative device. At the time that I built this Plaintiffs' Exhibit 9 I could have used it with commercial success if I could have got jobs to use it on. As to whether the device is a commercial success today, I would say that if it were not for the improvements on it that makes it easier to work, I could make money with it. In other words, I could make a commercial success out of the original device today if I didn't have to run it in competition with these devices that are improvements on it. I know that Plaintiffs' Exhibit No. 9 is an operative device because I have supervised the operation of it. If you tighten the nut

too tight, it won't turn, but if you adjust it properly it will turn.

Mr. Halliburton was present at the third test on the Pace well near Duncan. After the third test I sold out my interest to Mr. Halliburton; he bought me out for cash. The [fol. 591] first agreement that I made down in Arkansas with Mr. Halliburton called for giving me stock in a company, and after Mr. Halliburton saw this third test he bought me completely out by paying me cash, but I still held a little interest for quite a while, but he paid me out in cash or bought it out. I gave a man by the name of Henderson a half interest in the invention for money to apply for the patent and build a tool and carry on the expenses. When Mr. Halliburton made the first agreement with me in Arkansas on February 17, 1926, he paid Mr. Henderson and myself $2500 apiece in cash, and we were to get $10.000 each in stock in a $30,000 corporation. I had decided to sell out and let him go ahead with it, and I sold out to him. Mr. Henderson and I sold out our interest to him. I got $7500, in all, but I put $500 back to take some stock in the invention. Mr. Henderson received $5,000. Those payments were in addition to the money we had received down in Arkansas. After I had received the payment from Mr. Halliburton, I returned to Arkansas. I did not immediately afterwards leave the United States. I had nothing to do from then on for some time with the introduction of this tester to the trade. I went into the casing pulling business. I took my money and went in the casing pulling business, and I had nothing to do with Mr. Halliburton or with the device from that time on.

Cross-examination.

By Mr. Boyken:

I am at the present time employed as assistant superintendent of testing in the Houston district; the Gulf Coast district, for the Halliburton Oil Well Cementing Company. [fol. 592] The first time that I entered the employ of Mr. Halliburton's Company was in April of 1934, and have been employed by that company now somewhere around eighteen months or a little more. During that time I tested part of the time, and I have been assistant superintendent of testing for the last five or six months, and I am now so employed.

It is my testimony that I have used Plaintiffs' Exhibit No. 9 on three occasions. I supervised the using of it. I was present on the three occasions when Exhibit 9 was used. That tool was used on these three occasions for Pace's wells. They were located in or close to Duncan, Oklahoma. I never used the tool on any other occasion besides those three occasions for Mr. Pace. The first test was what I would call a perfect job. A sample of the mud fluid in the "rat-hole" was entrapped in the pipe above the valve. There was no oil. It was just gas that blew out through the mud that was in the pipe, and the mud sample was still in the pipe when it came out of the hole, in what came out of the "rat-hole" above the valve. There was no other fluid obtained in this sample chamber excepting rotary mud. The second job, we didn't get any fluid in the pipe, that is, we didn't take any out of the pipe when we raised the pipe from the hole.

Q. You raised the pipe from the hole after the valve was closed and there was no fluid of any kind in the pipe?

A. No, sir. We didn't close the valve.

The reason why we didn't close the valve was we were experimenting with this and I had changed the oil. I had changed the oil between the two blocks and tightened the nuts too tight. I don't know the depth that the tool was [fol. 593] operated in the second test, but it was some deeper than the first one.

Q. And by tightening that nut too tight you found you could not rotate the valve, did you?

A. I couldn't say that we couldn't rotate it. We opened the valve but in closing it we hadn't made the drill pipe up tight enough.

Q. You hadn't what?

A. We hadn't made the drill pipe up tight enough, and I had tightened my nuts too tight on the blocks.

Q. So that, as I understand you, in the second test, when you attempted to close the valve by rotating the drill pipe the valve didn't close?

A. No; the valve didn't close.

Q. And when you withdrew Exhibit No. 9 from the hole there was no fluid in the sampling chamber?

A. I beg your pardon?

Q. There was no liquid in the sampling chamber?

A. No. We pulled it out without mud; just left it open and came right out of the hole. The mud ran out as we

came out of the hole. We were satisfied there was nothing in this test because nothing entered the pipe and no air came out when we opened the valve. And we were satisfied from the test that there was nothing there.

Q. How was it you happened to tighten those valves so that they wouldn't close, that the two parts wouldn't close?

A. We were experimenting with it and I put a thinner oil between them to see if it would work as the engineer had claimed he thought it would do. So on the third test I put the same oil in that I was using on the first one and [fol. 594] it worked the same as it did on the first test, that is, on the third test.

Q. I want to come back just for a moment to the second of these tests. When you speak of putting in a thinner oil you mean a thinner oil between the two working parts of the valve?

A. Yes.

Q. And you found that oil was too thin?

A. I don't know that it was oil that was too thin or whether it was me adjusting my nuts on the stem too tight.

I believe the second test was made on the same well as the first test was made. I am not positive but it was deeper than the first test, I believe, on the same job, on the same well, rather. The third test was also for Mr. Pace. It was not on the same well as the first two. The third test, as I remember, was across the road from the well first tested. On the third test we opened the valve and the well started to blowing and the seat held and the mud didn't go down on the outside and the gas began to blow out through the pipe and sprayed some of the mud from the "rat-hole" where it entered through the valve. I mean that it came out at the top of the well, at the top of the drill pipe; and we left that for quite a little while and closed it and came out of the hole and there was a little mud left in the pipe. It hadn't blown it all out. The well wasn't strong enough to clear the pipe out. We didn't get any other fluid in the drill pipe above the valve; excepting rotary fluid or rotary mud. There was no oil showing in it. The only change in the tool between the second and third tests was that I just put different oil between the two blocks. I put in a thinner [fol. 595] oil. I didn't loosen that nut so that the two portions of the valve would rotate more easily; not necessarily. I adjusted it the very best I could at that time. I didn't

Q. You also applied for a patent on the device shown in Figure No. 9, or Exhibit No. 9, did you not, that is, the patent here in suit?

A. Yes, sir.

The patent drawing was not made from Plaintiffs' Exhibit 9. The tool there was made partly by the patent drawings, that is, I had the drawings made and it wasn't made exactly according to the drawings. The exposed slot is one of the differences, and I never did intend to have that ex-[fol. 598] posed that way in the first place. The patent drawing shouldn't show the exposed slot. The fact that it does was the engineer's fault; it wasn't mine. I don't know as there would be any big advantage in having the slot closed. My intention was to have it enclosed when I made the drawing. I had nothing to do with the making of the "J" slot device or the invention or design of it. We have been using it for some time but I didn't have anything to do with the designing of it at first at all.

Concerning those three tests that I supervised with Plaintiffs' Exhibit 9, the first job was between fourteen and fifteen hundred feet, if I am not mistaken. I am pretty sure that is right. The other two were deeper but I don't remember the exact depth. The second job was deeper and the third one was a little deeper than the first one but I don't remember the exact depth. The way I remember it is the first job was the shallowest job that I was on.

If you loosened the nut on Plaintiffs' Exhibit 9 too loose, of course, it would leak when you started in the hole, but if you put the proper grease in there or oil, then you could loosen it loose and it wouldn't leak. In order to rotate the valve, which is shown in my patent drawing, you do not necessarily have to have a seat for the packer. You can anchor the pipe on the bottom of the hole. To get a perfect test you will have to seat your packer. The packer can be expanded very quickly by the fluid from above it if you open the tool. If you open the tool, the mud from above will seat your packer if you have got it in place where it can be seated.

[fol. 599] By the Court:

Q. Just what do you mean by opening the tool?

A. To open the tool it releases the pressure from the bottom.

Q. Do you mean the valve?

A. Yes, sir; opening the valve of the tool.

I mean to say in testing with my device you don't have to first seat the packer and seal off the formation above from the formation below the packer, not all of the time. Sometimes you don't seat it at all. The seat won't hold. If the seat doesn't hold, you can rotate the vaive by turning the pipe, and that rotates a part of the valve, and you can close it in that way, too, whether the seat holds or not.

Q. Now, I want to know in that kind of a device, if you loosen that nut so that the two members of the valve rotate easier one with respect to the other, can you still hold that seat with the packer?

A. Well, if the packer is seated, your mud fluid pressure from above is going to hold the packer seated after you have opened your tool so that you can close it; and, if you put enough weight on the packer and push it in that hole—you can't very well put something in the hole that won't take a little pull to get it out, and then you are able to take practically all of your weight off of the pipe so that you can turn it.

Q. If that nut is loosened so that there is space in there between the two portions of the valve, isn't there the liability of fluid pressure entering into that space between those two valves and, therefore, spoil your test?

A. Well, there is a chance of a leakage in most all valves. I haven't seen any that was perfect, that wouldn't leak, I don't believe.

[fol. 600] Q. I am talking now about the valve as shown in the patent.

A. If you leave that tool loose, it would leak.

Q. And that would spoil your test?

A. Well, more than likely. If it leaked enough, it would.

Redirect examination.

By Mr. L. S. Lyon:

I have no doubt but that I could adjust that nut so that the valve was not too tight but was loose enough and have it operative so that it wouldn't leak. I did do it and I can do it again. When the nut is adjusted the tool is not

spring to push that valve into the seat. You have to raise your drill pipe first. I do not agree with the testimony of defendants' witnesses that the spring snaps the main valve shut. I have never had any experience or noticed anything at the well which would indicate that the spring snaps the main valve shut. I do not believe it is possible for the spring to snap the main valve shut at that point.

Cross-examination.

By Mr. Morgan:

I left the Johnston Company in July of this year, after working for that company four months, and I went to work immediately for the Halliburton Company. Mr. Linville and I didn't leave together. We didn't leave at the same time. He left first. I left within a week after Mr. Linville. Mr. Halliburton did not contact me, neither did I contact Mr. Halliburton, before I went to work for the Halliburton Company. I first contacted Mr. Linville. I happened to be in conversation with Mr. Linville and he told me there was a job open with the Halliburton Company for me if I wanted it. I had heard of the decision in the Texas case. I talked with Mr. M. O. Johnston before I left.

Q. Didn't you tell him that you were going to work for the Universal Consolidated Oil Company?

A. Yes; I had a job out there.

Q. And you did not go to work for that company, did you?

A. No, sir.

[fol. 615] Q. Instead of that you went to work for the plaintiff company here?

A. That is right.

Before going to work for the Halliburton Company I had run several Johnston tests on wells. I hadn't done any testing before I went to work for the Johnston Company, other than just being a driller on the well that run a test. I had run a number of Johnston tests on wells that I was drilling on before I went to work for the Johnston Company. Altogether, in point of time, I have been testing since March of this year, when I first went to work for the Johnston Company.

I understand a well in normal condition to be tested means a good hole, out to gauge, reasonably straight. Oil wells don't have to be exactly perfect. These packers that we run in the hole, they are usually an inch under the diameter of the big hole, that is, the cone packers, and the hole doesn't have to be perfect to get the packer down. I mean by normal condition a condition where we have a reasonably straight hole with no obstructions and with no leak in the drill pipe, and no difficulty in seating the packer; also when you do not have to spud a great many times, and also where you encounter no difficulty whatever in removing your packer. I would say that these conditions obtain in 75 per cent of the wells. 75 per cent of the wells are in good condition. 75 per cent of the time we find the hole without any obstructions whatever. I am referring to deep holes, say between 6,000 and 10,000 feet in depth. I don't say that it is necessary to spud your packer all the time on the seat, or even any of the time. There have been tests made without even spudding. I would say that [fol. 616] you have to spud before you get a firm seat for the packer usually twice or three times. I mean by that, just spud your packer on the seat. You first get your packer on the seat, and then take the slack out of this drill pipe and drop it down again, and you have a mark on your drill pipe at your table, and you can tell whether it goes down or not, and if it doesn't go down you consider your packer seated. I have not figured out in percentages, what percentage of the time you are able to make a complete seat, a satisfactory seat, without spudding the packer. You do not have to spud almost always; you don't have to spud always. Whether you spud or not depends on the condition of the formation you are going to test. I would say the percentage of the time, in my experience, I have had to spud, against the time when I did not have to spud, would be fifty-fifty; depending on the formation you are going to seat your packer on. In spudding you drop your packer on the formation seat. In raising the drill pipe again we try not to pull the packer off the seat.

Q. In spudding you raise the drill pipe, don't you?
A. That is right.

Q. And in doing so what do you do to the main valve?
A. You close it.

tions normally and does not open before the packer reaches its seat, the trip valve does not necessarily perform any actual function in the taking of the test. In spudding with the Johnston tool to seat the packer the main valve cannot open unless the packer has sufficiently seated to shut off the pressure of the drilling fluid. Whether the Johnston tester can be operated without the spring on the main valve, I couldn't say for sure, but I know that I have run a test with a new spring on the tool, and when I came out of the hole there was no tension on the spring because the spring lost its tension; it wasn't tempered right to respond back to its normal position. If the spring loses its tension it cannot perform any function. This last test that I have referred to was a successful test. It is necessary to move the drill pipe in order to close the main valve in the Johnston tool after the test has been received, because the main valve is fastened direct onto the drill pipe, and the only way it can be moved is by moving the drill pipe. I do not agree with the testimony of defendants' witnesses that the spring snaps the main valve shut. My experience in that regard is that you have to release the tension on that spring before that spring can close the valve.

Cross-examination.

By Mr. Morgan:

I was working for either the present defendant company or its predecessor in California since September of 1930. I was one of the first employees that Mr. Johnston had. Prior to the time that I came to work for the Johnston Company I was in Canada, drilling for C. R. Craft. I have personally drilled two wells in my lifetime. That is my [fol. 604] entire experience in the oil fields. I was not using rotary tools; I was using cable tools. I never used a rotary tool in drilling a well, but I have supervised the drilling of several rotary wells. I have been in oil work since November of 1916 continuously, with the exception of one year from July of 1928 until the spring of 1929. I went to work in the field as a tool dresser and went from that to a gang pusher or roustabout boss; from that to assistant lease foreman, and after I left that company I went as superintendent for the Keystone Oil Company and put down two rotary holes for them and supervised the drilling.

I had just finished a job of drilling in Canada when I first entered the employ of the Johnston Company. I was not looking for work and got a job with the Johnston people. Mr. Van Deinse wrote me in Canada and gave me the proposition of the tool and asked me if I would come to California to work for him. Mr. Van Deinse was then president of the Johnston Company. At that time I had never used a tester, and my first experience with testers was with the Johnston tester. At the time I went to work for the Johnston Company, the tester they were using had a trip valve. I would say that I have operated the Johnston device without a trip valve four or five times. I mentioned in my direct examination one particular test which was with the Associated Oil Company at Seal Beach. If I remember rightly, the well was in the neighborhood of 6,000 feet deep. I did not encounter any difficulties in getting down to where I was going to make the test. In other words, I had a perfect well so far as the trip downward was concerned, and in coming out there was no evidence of any leak in the drill stem, and I had a [fol. 605] successful test. It showed water with some oil. It showed drilling fluid on top of the test; I would say in the neighborhood of 20 feet of drilling fluid on top of the test. I can't say for sure where the other wells that I tested without a trip valve were located, because I have never kept track of the wells I have tested. I recall the Mascot well for the Standard Oil Company. I tested that well with the Johnston tester, using a trip valve. I cannot say for sure whether I ran tests on that well without a trip valve or not, but I know I have used a trip valve on that well. I don't recall making a test of that well on January 15, 1933, without a trip valve. I don't recall it. I know that I ran tests on that well for possibly six weeks' time. I don't recall that on one occasion, on January 15, 1933, I ran a Johnston tester on that well; that I set the packer at 8,595 feet; that I had no trip valve; that I did not get any blow through the drill pipe, which acted as though no fluid were entering the hole; that I left the tester stand for two hours and found that the fluid had equalized inside and outside of the drill pipe, and that the valve had evidently opened while running in. Possibly I did but I do not remember. I have no recollection of the case that you mention. I positively have no recollection of running a test upon that well without using a trip valve. Not all of the tests that I ran with the trip valve proved successful.

a seat and during the process of spudding in, that is, coming up and down, trying to jam your packer into a firm seat, each time you jam down on the formation you open the valve, and when you raise it up fluid does not rush in. I do not mean to say that you can spud your packer without opening your main valve to the entrance of fluid. I said that you would open the valve every time you would set the weight of the pipe down on the packer. Doing that would open the main valve to the entrance of the drilling fluid. You don't open the valve to the fluid above the packer. You open it to the fluid below the packer that is in the "rat-hole." When you first set it down in that first spudding operation that drilling fluid would rush up, and if you had no trip valve there it would rush up into the drill pipe. When you set it down the first time, you would not then pull it up, in the first step [fol. 609] in the spudding. You simply take the spring out of the pipe; and you don't lift the packer off of the seat after it once goes on the seat. If sometimes it is lifted clear of the seat, it is a case of accident. If you haven't a perfect seat, that indicates there is a leak down from the upper section of the well down into the "rat-hole." It is hard to tell, while you are lifting up and down, until you do get a firm seat, that fluid is going down into the "rat-hole" and being taken up into the drilling pipe by the opening of the valve, because you can't see the condition of your seat or the shoulder. If you have a trip valve you don't care. It doesn't amount to anything if the trip valve is there. If the trip valve isn't there you don't know exactly what you are doing, and you don't know whether you are going to get a test or not. The main spring has been a part of the main valve ever since I have known the Johnston tester. I have never experienced a jar at the top of the well as the pipe was being lifted and the main spring worked. I have never heard of that jar. I have worked on wells where Mr. Heitmeyer was the engineer in charge, and I have never experienced that jar in closing the valve. I recall only one test where the main spring was not utilized. That test was for the Standard Oil Company in the Baldwin Hills. I don't remember who the operator was or who was in charge of the operation. I can't recall the exact man who was in charge, because I have run possibly a hundred or more tests. I could give you the names of the tool pushers on the lease, but the

one that was on this particular job I could not tell you. I don't know who was the engineer of the Standard Oil Company who was in charge. They have three different engineers that witnessed those tests. I couldn't tell you [fol. 610] who was in charge of this particular test. I have never run a test without the main spring. It is a fact that when you lift the packer from its seat in withdrawing the device from the well that the packer always jumps or bounds as it is being pulled off of that seat. I don't wish to express an opinion on whether there is a tendency of the main valve on the Johnston tool to open when the packer is raised from its seat. What I would say was the cause of the rebound, is like anything sticking tight in a hole, you take a strain or stretch on the drill pipe, and when that packer leaves you get a rebound on the drill pipe. The sudden release there, the same as a rubber band. If you hold a rubber band tight and leave loose of it you get a rebound. As I said before, I couldn't say whether that rebound would tend to force open the main valve.

The paper that you show me is a test ticket made out for the Standard Oil Company Mascot No. 1 at Taft. That ticket is made out in my handwriting, and indicates a mis-run. There is nothing on the ticket to indicate whether or not the trip valve was used in that run. One reason that it was a mis-run was that I lost the packer in there. I couldn't tell you what run that ticket was made for, because it isn't numbered or doesn't designate any one specific run. It contains a date. The ticket does not aid me at all in recalling this particular test, because I ran, I couldn't say exactly how many, possibly four or five tests on that well. The word "Cancelled" written upon this particular ticket is not in my handwriting. I have no recollection of that particular test at all, and no recollection as to whether or not the trip valve was used in connection with it.

[fol. 611] Don W. Bivens, called as a witness on behalf of plaintiffs, in rebuttal, being first duly sworn, testified as follows:

Direct examination.

By Mr. L. S. Lyon:

My name is Don W. Bivens. I reside at Huntington Park, California. I am 31 years of age, and by occupation

oil well tester for the Halliburton Oil Well Cementing Company. I have been employed by the Halliburton Oil Well Cementing Company since last July. My employment with that company has been here in California. Prior to going to work for the Halliburton Company, immediately before that, I was employed with the M. O. Johnston Oil Field Service Corporation, one of the defendants here. I was employed as a tester in the Los Angeles Basin, and at Bakersfield also. I would say that while in the employ of the Johnston Company I made approximately a hundred tests, and in making these tests I employed the Johnston tester of the type illustrated in the full sized device here on the floor, Exhibit D. I was employed by the defendant Johnston Company from last March until July. Prior to going to work on the Johnston tester I had not been employed by any formation testing company. I had been a driller prior to going to work for the Johnston Company, and until employed by that company I had never supervised a test. I went to drilling for the Ohio Oil Company in 1928. I drilled for several other companies, before that; and I had roughnecked and worked derrick and everything, just did general drilling work on the rigs. At the time I went to work for the Johnston Company I was an experi- [fol. 612] enced and fully qualified rotary driller; at least I was getting paid for it.

I have heard the testimony of Mr. O'Neill, Mr. Dear, and Mr. Abbett. I do not agree with those witnesses that the inlet to the Johnston tester is the trip valve, as distinguished from the main valve. I would say that the inlet valve of the Johnston tester is the main valve. The trip valve is not a part of the tester. The function that is served by that trip valve is that of a safety valve. If the test proceeds normally, as intended, with the Johnston tester, the trip valve does not perform any useful function. If you don't meet any obstructions going in the hole, you can get a test without it. I don't think it is very frequent that you would run into obstructions going into the hole to make a test with the Johnston tester that would open the main valve. If the hole is properly conditioned, you don't meet any obstructions at all.

Q. In spudding with the Johnston tester do you open the hole below the packer to the pressure of the drilling fluid at any time that the main valve is open?

A. Well, do you mean by that that the pressure above the packer——

Q. Yes.

A. Well, if the packer is properly seated you wouldn't open it under pressure, I don't think.

Q. And in order to open the main valve the packer has to seat, does it not?

A. Yes.

Q. And if the packer is seated to open the main valve, even in spudding the packer seals off the well below the [fol. 613] packer from the pressure of the drilling fluid above; is that correct?

A. Yes.

The spring on the main valve has always been present at all tests that I have made with the Johnston tool. I have released the tension on the spring a time or two. In order to render the spring operative on the Johnston main valve you have got to turn up the adjusting nut to apply tension to it. If you apply no tension to the spring on the main valve of the Johnston device the spring cannot perform any function in the operation of the tester. I don't think it could, until your valve had opened and had reached that tension on the spring where it would be hanging. I have operated the Johnston tester for the defendant corporation with the spring in the condition last described. One such occasion was for the Standard Oil Company at Trico, 17 miles west of Delano. We relieved the tension on the spring, on that test. The formation was so soft that it wouldn't hold the packer, and we had to let the tension off. The reason why we took the tension off the spring was because you couldn't seat the packer against the formation and take your test and open your valve unless you had released this spring, relieved that tension on the spring first. By relieving the tension on the spring, it just left the spring loose. The reason for doing this was that we didn't have to put so much weight on the packer to open the main valve. On the occasion of that test we recovered about 2200 feet of salt water. I would say that was a highly successful test. Upon completing tests with the Johnston tool, in order to close the main valve you have to lift your drill pipe up and pull your [fol. 614] valve into the seat. It is not possible for the

Q. You close the main valve?

A. Yes; on the Johnston tool.

Q. And what happens to the equalizing valve when you close the main valve in that spudding?

A. It remains closed.

Q. Doesn't the equalizing valve open when you close that main valve?

A. Yes.

[fol. 617] Q. And doesn't the fluid then rush down into the "rat-hole"?

A. That is right.

Q. And then you put the pipe down again and open the valve, don't you, in the next motion of the spudding operation?

A. If the trip valve was closed, you don't take in any fluid.

Q. If the trip valve is there, then no fluid comes in, is that correct?

A. That is right.

Q. But, suppose you have no trip valve. Then what happens?

A. You just have to work accordingly. You have to set your packer on the seat and try not to lift it up.

Q. But, if the trip valve isn't there, then, when you put that device down again in the spudding operation, the main valve opens and the fluid that has come down into the "rat-hole" through the equalizing valve rushes up into the chamber, does it not?

A. Yes; it would.

Q. And doesn't the trip valve serve the purpose of preventing that very thing?

A. That is right.

Q. And that would happen every time you spudded, would it not, or 50 per cent of the time that you ran tests?

A. 50 per cent of the time that you pulled your packer up like that or your drill pipe up.

Q. You say in the tests that you have been familiar with you have had to spud 50 per cent of the time. Now, if you had to do that 50 per cent of the time, would not [fol. 618] the device, if there were no trip valve there then, take the drilling fluid that has gone down into the "rat-hole" through the equalizing valve in the upward motion of the spudding? Wouldn't that rush up into the chamber?

A. Sure.

Q. And it would spoil your test, wouldn't it?
A. Yes.
Q. Did you ever run the Johnston tool without the trip valve?
A. No.

Redirect examination.

By Mr. L. S. Lyon:

When you are running the Johnston tool and seating the packer, you leave weight on your indicator so as to avoid unseating the packer when you are spudding. You ordinarily leave about 8 points of weight on the indicator. You always leave at least two points to be sure you don't unseat or pull the packer off of the seat during spudding. The precaution that we take to avoid lifting the packer off of the seat when we are spudding to seat the packer with the Johnston tool is that we usually look at what the weight indicator reads before it goes onto the seat. Then you set your packer down on the seat and make a mark on your drill pipe and ~~pick it up again~~ almost to the mark and drop it again. We watch the indicator to see that we don't pick it up too high. We tell the driller not to pick it up past a certain point on the weight indicator. That keeps us from pulling the packer off of the seat. In spudding with the Johnston tester the packer is not, except by accident, allowed to leave the seat. It is [fol. 619] possible to open the equalizing valve on the packer of the Johnston tester without unseating the packer; if you pick it up high enough, it will.

By the Court:

Q. Does the equalizing valve open before you pick up the packer?
A. Yes.
Q. It does?
A. Yes, sir.

In the spudding operation any drilling fluid that enters the tester through the main valve must come from below the packer. It must be drilling fluid that is down in the "rat-hole". If your packer is properly seated, the pressure of the drilling fluid above the packer will not be imposed on the drilling fluid in the "rat-hole".

down in the well or in the casing. It is on top, out where you can get to it, out on the derrick floor.

Referring to the drawing in my patent Figure 1 shows in dotted lines some pipe 23 to which the tester is attached. That is attached before running the tool; when you start to run the tool in the well, and after the nut has been adjusted. This patent drawing was made from a drawing that I had made. The patent drawing was made by a patent attorney in Washington. This drawing that I have here in my hand was supposed to be made in Washington, but it was made from my blue print that I had made by the Eby Engineering Company in Eldorado, Arkansas. I paid for that blueprint and got a receipt. I gave a check to them that Mr. Henderson gave me, and I got a receipt for it. The photostatic copy of Plaintiffs' Exhibit No. 8 in the Texas case is a photostatic copy of the receipt that I got when I paid for that drawing.

(The receipt last referred to was offered and received in evidence as Plaintiffs' Exhibit 18.)

(Book of Exhibits, p. 230.)

[fol. 601] After obtaining three blue prints I took one of the prints to the machine shop and had the tool made. I took it myself. I sent another print of it to the patent attorneys. Mr. Henderson and I fixed up the papers, and he did the mailing of the other copy to Washington.

(Plaintiffs' Exhibits 6, 7 and 8 for Identification were offered and received in evidence as Plaintiffs' Exhibits 6, 7 and 8, respectively.)

George R. Linville, called as a witness on behalf of plaintiffs, in rebuttal, being first duly sworn, testified as follows:

Direct examination:

My name is George R. Linville. I reside at 2747 Glenview Avenue, Los Angeles, California. I am 45 years of age, and at the present time am service man for the Halliburton Oil Well Cementing Company, servicing testing equipment in the Los Angeles basin. I was employed by the defendant M. O. Johnston Oil Field Service Corporation from the time that company was organized until July,

1935. I was employed by the defendant corporation as a tester. I was the man that went to the wells with the Johnston tester and supervised the running of it. The defendant M. O. Johnston Oil Field Service Corporation was organized, I believe, sometime around June, 1933. Prior to the organization of the last named company I was employed as a tester for the Johnston Formation Testing Company of California, which was the predecessor of the present defendant. The predecessor of the defendant corporation in testing wells employed the same tool as the defendant corporation is now using. I went to work for the [fol. 602] Johnston Formation Testing Company of California in September, 1930, and worked for them continuously up until that company was succeeded by the present defendant. Prior to going to work for the Johnston Company in 1930 I was a cable tool driller, and had drilled in Canada. I would say that I have personally supervised in the neighborhood of 500 tests with the Johnston tool.

I heard the testimony of Mr. O'Neill, Mr. Abbett, and Mr. Dear in this case regarding how the Johnston tool operates. Referring to their statement that the trip valve is an essential part of the tester, I agree with them in this way, that it is a safety valve. It is not part of the tester. In my first operations with the Johnston tester a trip valve was employed. I have been present and operated the Johnston tester without the trip valve. On these occasions Mr. M. O. Johnston was not present, to my knowledge. One of the occasions when the Johnston tester was operated without a trip valve was when I ran a test for the Associated Oil Company at Seal Beach, California. I supervised the running of the test. This test was made with the Johnston tester, and there was no trip valve. The first time I run in the hole and was unable to get the valve open. It was a 2½ inch tool. We were running in 2-inch drill pipe, and the first run I could not get the valve open because I couldn't get the go-devil down through the pipe. We came out of the hole, and, so as to eliminate any chance of not getting it open the second time, so as to complete the test that day, we took the trip valve out and ran the tool without the trip valve. This test was a successful test. Ordinarily, in the normal operation [fol. 603] of the Johnston tool, the main valve does not open before the packer reaches the seat. If the main valve func-

Q. Did it prove successful in any instance except the one you have mentioned in relation to the Associated Oil Company?

A. Without a trip valve, do you mean?

Q. Yes.

A. Yes.

[fol. 606] I can't recall at the present time where that was. I don't recall the name of the company, nor the operators, nor the engineer in charge. I remember that it was a formation test in some of those cases, and outside of the one test that I have mentioned, for the Associated Oil Company, I can't recall the company, and I cannot recall the well, or anyone present. As far as I remember, the other tests that I made without a trip valve were successful.

Q. And you can't recall any unsuccessful tests?

A. I can recall lots of unsuccessful tests because when we first started running tests in the field we had more unsuccessful tests than we did successful.

Q. I am talking about tests without the trip valve. You mentioned four tests that you have made without the trip valve. You have given one that you are able to describe, one that you cannot describe either as to the well or the owner, or the operator or anything else, and now you have mentioned two others. Can you give us any information as to these other two tests that you say you made without the trip valve?

A. Well, my answer is the same as it was before. At that time——

Q. No. Do you recall them or not?

Mr. L. S. Lyon: Let him finish his answer.

The Court: He says he can't remember any more.

A. I wanted to explain why it is impossible for me to remember. Over a time of five years the number of wells that I have been on and the number of wells I have tested and under different conditions makes it impossible for me to recall the exact wells which you mention.

[fol. 607] I left the Johnston Company on the 15th day of July, 1935. I worked continuously for the Johnston companies in this State from 1930 up until July of this year, and at that time I quit the Johnston Company to go to work for the Halliburton Company. That was after the decision in the Texas case. The only time that I ever

solicited business for the Johnston Company was in company with Mr. Johnston. I have made representations to operators as to the Johnston tool. I talked with quite a few men in the Los Angeles Basin. In talking with people about the trip valve in connection with the Johnston tester, I always spoke of the trip valve as a safety valve. I cannot recall the direct words that I told any operator any more than I explained the tool to them, how the tool worked and which was the main valve and which was the trip valve or safety valve.

If you ran a Johnston tester down into a hole and met with obstructions therein, you would open the main valve, and would be unable to get a satisfactory test.

Q. In other words, then, without the trip valve you would not be able to get a satisfactory test if you encountered obstructions on the road down into the hole?

A. No.

Q. And you very often encounter obstructions, do you not?

A. No. I would say not over 15 per cent of the time do we contact obstructions in the hole.

Q. Then, you would say that in 15 per cent of the tests the trip valve would be necessary?

A. Yes; in the case of encountering obstructions in the hole.

[fol. 608] It is a fact that when you get down to the place where you intend to set your packer, if it be a "rat-hole" formation, you sometimes have difficulty in obtaining a firm seat with your packer, and that you have to do what is known as spudding, that is, you have to lift up and jam down and lift up and jam down several times. That operation may be repeated as many as 15 or 20 times before you get a firm seat. Each time you do that your main valve opens. If there was no trip valve and your packer would leak when you first set it on the seat, you would be unable to get a satisfactory test. But in many tests in the early days, when we were introducing the tool in California, we never spudded the packer on the shoulder. We have been doing it recently since we have had these deeper holes. With a few exceptions, in the early days the wells were not nearly as deep as they are now. Before you get

tubing closed while drawing it." In other words, he wanted to keep the fluid out of the tubing while he was putting the tubing into the well and while he was withdrawing it.

Q. He refers to the use of his device, does he not, in a flowing well or a well that will flow?

A. Yes.

Q. Now then, why would you want to avoid entrapping or carrying out any fluid in your pipe while you were pulling it out of such a well, if that is so?

A. He intended that the device——

Q. Never mind. I asked you why would it be desired in operating a device of the kind shown in the Franklin patent, in the case of a well that Franklin directs that it be put [fol. 631] into, that you should not lift any of the fluid out of the well when you pull the pipe out.

A. Franklin intended his device to be ~~put in~~ on the tubing in a well that flows by heads. He ~~states~~ that it can be used like an intermittent flowing device, that he can open and close it by hand. He doesn't want the oil to flow out through the tubing all over the workmen while it is being withdrawn and while it is being inserted in the well.

"Mr. Boyken: I move to strike that out unless it says so in the patent.

The Court: He states what he wants. Strike that out."

It is simple to put a breakable disc in to keep it from flowing while you insert the tubing, so he intended his device not only to serve that function, but also to serve the function of closing the tubing, so that it could be brought out empty and not flow on the workmen while it is being withdrawn.

The Court: What would he want to bring it out for?

A. When he was pulling the tubing, for some reason.

By Mr. L. S. Lyon:

Q. What do you pull tubing in wells for?

A. To clean out, using a sand pump——

Q. When you have tubing in a flowing well or a well that flows by head is it common practice to have to pull the tubing from time to time in the well?

A. Yes, in certain formations.

[fol. 632] Q. And is it the practice or desirable to exclude the fluid from that tubing while you are pulling it out?

A. Yes. It is desired to exclude the flowing while you are withdrawing it.

Q. As one skilled in the art, from reading this Franklin patent and studying this drawing would you understand that the Franklin valve was to be closed to entrap a sample to be lifted out of the well or was not?

A. No. Franklin teaches to construct it in such a way that you would not bring out fluid, so that it would leak.

Q. Will you point that out to the court?

A. At line 14 on page 2, Franklin states: "Between the shoulder b^2 and the flange b^1 there is enough room to leave a very little play vertically to the parts lying between. When the tubing is in the well the upper section is often held in suspension slightly, just to keep it taut. This relieves the disk D of the weight of the tubing, and when the device is closed the pressure of gas keeps it seated on the part C above it, so there will be no leak, and the tubing can be easily turned the half-turn necessary to open or close the valve."

In other words, he had play between those parts, so that it would turn easy, and so that the gas pressure would move the device up vertically. If the device was submerged in oil, oil could leak from the outside and between the part C and b^1, down around the shoulder b^1 and in between the plates, and turn down, below or up.

Q. You say oil would leak. What would be true if the device was submerged in drilling fluid, mud fluid?

A. Any device made in accordance with this patent will leak when it is inserted into the well, and will leak when the [fol. 633] pressure of the fluid on the inside exceeds the pressure outside.

Q. When you say "inserted into the well," you mean submerged in liquid in the well?

A. Yes.

Q. And the liquid can leak from the outside in?

A. Yes.

Q. Now, what do you mean by the rest of your statement?

A. I mean that the device would allow mud fluid to pass down between the part C and the parts b and b^1, and down between the plates, and would leak, let fluid in. Especially would that happen if you had opened the valve.

Q. Would a man skilled in the art, desiring a valve structure for the purposes of the tester described in the Simmons

prior art. I am not going to go over it all because I don't think it is at all necessary in view of the testimony of Mr. Abbett.

Q. Will you please refer to the Franklin patent, Exhibit H-9? Is the device there shown and described adapted or intended for making the kind of a formation test which is the object of the patent in suit?

A. No.

"Mr. Boyken: I want to make the same objection I made before, your Honor, that Mr. Halliburton is the plaintiff in [fol. 628] this case, or one of the plaintiffs, and any statements that he may make on the witness stand are merely self-serving declarations and he is in effect arguing his own case. I think that the Court has control over the expert testimony in this case. And I object to Mr. Halliburton expressing his opinions as to what is shown in these patents which are in evidence because he is the plaintiff in the case.

The Court: No matter who a witness is, if he can convince the Court that he knows what he is talking about and is telling the truth, he should be listened to, shouldn't he? In other words, there is no legal disqualification against Mr. Halliburton, is there?

Mr. Boyken: No, your Honor. If he is testifying as to matters of fact, there is none.

The Court: I know. But what is the difference between Mr. Halliburton hiring say Mr. Smith as a patent expert to testify and testifying himself?

Mr. Boyken: It goes largely to the weight of his evidence.

The Court: Should not a court as readily believe a party to an action who convinces it that he is telling the truth as someone who is employed by him as a regular expert? I see no reason why the party himself may not testify in an expert way. As you say, there is a distinction as to the weight of the evidence. That is true, of course, and that is an important matter always. That is true. I see, however, no legal impediment to it.

Mr. Boyken: We have gone all over these patents with Mr. Abbett and opposing counsel has cross-examined him, and we are relying on what is said in these patents. Now, to have Mr. Halliburton express his opinions as an expert [fol. 629] witness is in effect arguing his own case. And,

since the Court has control of the expert testimony in a case of this kind, I want to interpose that objection.

The Court: No. I will hear Mr. Halliburton. The objection is overruled.

Mr. Boyken: An exception. And may it be understood that we enter this objection to all of his testimony?

The Court: Yes."

Q. Will you please now compare and distinguish the operation disclosed and intended in the Franklin patent from that disclosed and intended in the patent in suit and point out wherein the device shown in the Franklin patent is not adapted for the latter?

A. Franklin did not want to entrap a sample. He wanted to keep the oil out of the pipe.

"Mr. Boyken: I object to that and ask that it be stricken out as to what Franklin intended to do. The witness should be confined to what appears in the Franklin patent.

A. I will read from the Franklin patent and explain why.

The Court: Strike out the statement up to this point.

Mr. L. S. Lyon: He is testifying as an expert, your Honor, one skilled in this art, as to what this patent would teach us to do.

The Court: I think he is going too far when he says what Franklin wanted. In the first place, what he says is in his patent.

[fol. 630] Mr. L. S. Lyon: I infer that what he means by that is what would be desired in the kind of an operation that Franklin describes in his patent."

The Court: The witness will refer to the pertinent parts of the patent for what he means.

The Witness: Franklin states at line 20 on the first page. "My device is intended to perform the offices of two different classes of devices now in use for controlling and regulating the flow of wells, as follows: When the tubing is being put into the well or withdrawn from it, it is desirable that no flow take place through it. This is effected, so far as the placing in of the tubing, by a brittle disc, which is placed in the tubing at one of the lower joints, and which closes the tubing until it is broken, which is done after the tubing is in the well by dropping down upon it a sufficient weight to break it; but this is of no service in keeping the

patent in suit, select a valve of the type described in the Franklin patent?

A. No. Franklin describes his valve as a damper valve. He means by that a valve in which there is a disk that can move up or down, and he so states at line 92: "There are in the disk D pin-holes p p, which fit over pins p[1], set in the shoulder b[2], and thus the disk D is prevented from turning around, but is allowed to move vertically."

In other words, Franklin doesn't make any provision to adjust his device so that fluid cannot come in from the outside, so that fluid can leak from the inside out, and the fluid could pass into the tubing from the outside in.

The Court: From the outside where?

A. From down between the space between C and B.

[fol. 634] By Mr. L. S. Lyon:

Q. You mean from the outside, if this valve was put down under the top of the fluid in the well?

A. Yes.

Q. Then show the Court how the fluid would flow into it.

A. Your Honor, you see there is an opening between the neck of C and B here, in which, if you will follow my pencil, down around the space that is white in between those parts, that is an opening——

The Court: What is that opening for?

A. Well, that opening is just a part of the structure of the device. He provides on the inside of that shoulder, which the fluid will follow around that and down between the two disks, and up through C and into the pipe.

The Court: Is this supposed to be, this space between b[1]—and what is the other?

The Witness: And C?

The Court: No, not C, but the thing that encloses C, is that supposed to be fluid-tight?

A. No, sir. That is loose. There is nothing tight in between this space B and C, and the fluid can pass down through there, and there is vertical movement between the part D on its pins and the part C, so that there is an opening between that space. Franklin didn't care to keep any fluid in his pipe. He wanted to keep it from getting in there, and this would drain out, oil would drain out of it as he pulled it out of the well.

The Court: What is the object of B?

A. B, among other things, is cut out in such a manner, as shown in Figure 4, at b b, which cooperates with C^2, a lug, and limits the rotation of the device.

[fol. 635] By Mr. L. S. Lyon:

Q. Do you understand from the Franklin patent the purpose for which he intends his device and how it would be assembled in a well?

A. Yes.

Q. Would there be any packer on the pipe which carried the valve structure?

A. He doesn't teach that there would be any packer on the pipe that carries the valve structure.

Q. From your understanding of what his device is for and how it would be used, as stated in the patent, would there be any such packer?

A. No.

Q. Would a packer interfere with the object that Franklin is directing his patent at?

A. It would, if he uses the device as an intermittent flowing device, because the packer would seal off his reservoir where he accumulates his gas to flow the oil out, that is, the space between the tubing and the casing.

Q. I show you Figure 4, entitled "Prior Franklin Patent," in the back of this copy of the brief which is Exhibit 16 in the Texas case, which was the brief filed before the Board of Appeals. Can you take that figure and show the Court or use it to illustrate to the Court how the Franklin device, as stated in the Franklin patent specification, would be put into a well, how it would be used, and illustrate to the Court the statement that you have made that the packer, if on the tube that carries the valve, would defeat Franklin's purpose?

A. Yes.

Q. Will you please do so?

A. Yes. Franklin intended that——

[fol. 636] The Court: You are referring to the figure here?

A. Yes, your Honor. I am referring to this exhibit which illustrates——

The Court: That isn't found in the Franklin patent?

A. No. However, from my study of the Franklin patent, it is intended that the device should be used that way.

Recross-examination.

By Mr. Morgan:

Before the packer is properly seated and while you are spudding, each time you raise you close the valve and the equalizing valve opens, allowing the fluid from above to come down into the "rat-hole," if you pick it up high enough; and then when you come back again on the seat with the weight of your drill pipe and the valve is open, it will open to that drilling fluid that had previously gone down into the "rat-hole". And if you haven't got a trip valve, your sample is spoiled, unless you have pressure enough to blow it out. This is a condition that is seldom encountered.

[fol. 620] Don W. Bivens, recalled as a witness in behalf of plaintiffs, in rebuttal, having been previously sworn, testified further as follows:

Direct examination.

By Mr. L. S. Lyon:

Ordinarily in spudding the packer with the Johnston tester you do not open the equalizing valve. As I explained a while ago, you make a mark across your drill pipe after you have seated your packer, with the weight of the drill pipe on the packer, and then you pick up and then spud this down again. You have a four-inch travel there in your equalizing valve ordinarily, a four-inch slide, that is, it slides inside of a mandrel. If you seat your packer, you would have to pick up 4 inches in order to open the equalizing valve. I mean 4 inches in addition to the weight of the drill pipe. In spudding you regulate the amount that you pick up so that you won't open the equalizing valve; ordinarily by picking it up within two points or something like that, if you have a weight indicator, and, otherwise, you make a mark with a piece of chalk on your drill pipe. In spudding you never raise the drill pipe far enough to open the equalizing valve. The answers that I gave at the close of my cross-examination regarding the function that could be performed by the trip valve were based on my assumption that the ques-

tions called for opening the equalizing valve when you were spudding. The way that I understood it was that he wanted to pick it completely up and spud.

[fol. 621] Cross-examination.

By Mr. Morgan:

In the spudding operation, if you pick the pipe up high enough the equalizing valve is opened. During my cross-examination by you I believe I stated that if you picked up the drill pipe high enough it would open the equalizing valve. During the recess I told Mr. Lyon that I wanted to point out something else that I didn't get a chance to. Before talking to Mr. Lyon I talked with the other boys out in the hall. I did not talk to Mr. Halliburton. I talked to the boys about the equalizing valve during the recess.

Q. When you spud you raise the pipe high enough, do you not, just so that you won't disturb the packer?

A. Well, no. You don't want to pull your packer off of the seat or disturb it. You don't have to pick up all of the weight of your drill pipe to spud, either.

Q. You pick up far enough so as not to disturb the packer, isn't that true?

A. I don't understand just exactly how you mean that.

The Court: He means that you pull it up as far as you can go without disturbing the packer, I think.

Mr. Morgan: Yes, your Honor.

By the Court:

Q. Is that right?

A. Well, I wouldn't say as far as you can go; no. As I told you, if we have no weight indicator, we make a mark and we don't pull quite up to that.

Q. At any rate, you do not exceed that mark that you make for fear of disturbing the packer?

A. That is right.

[fol. 622] The purpose of the equalizing valve is to enable one to take the packer off of the seat, to make the pressure below the packer the same as it is above the packer, and if the equalizing valve works as it is supposed to, it allows the drilling fluid above the packer to enter the "rathole". There have been tests made where the equalizing

valve was plugged. The equalizing valve oper[illegible], if it operates at all and for any purpose, before the packer is removed, and the equalizing valve is opened before the packer is disturbed and the fluid rushes down into the "rat-hole" and equalizes the pressure above and below the packer, making the packer more easily drawn from its seat. You have to draw that pipe up far enough so as to open the equalizing valve before you disturb the packer. You have to take all the weight off of your drill pipe and close your main valve, and then just keep right on pulling up until the equalizing valve opens. I would say that the equalizing valve opens right after the main valve closes. On the Johnston device it opens almost immediately upon the closing of the main valve. My estimation is that after you close your main valve and you are pulling your pipe up you continue to pull up until your equalizing valve is open after you have made your test. I stated a moment ago that the equalizing valve opened after the main valve closed. As to the length of time elapsing after the closing of the main valve, the opening of the equalizing valve depends upon the speed that the driller raises the drill pipe.

The Court: I think that should be an easy question to answer. Does the closing of the main valve affect the opening of the equalizing valve? Do the two things have anything to do with each other?

[fol. 623] A. Well, the equalizing valve does not have a spring on it.

Q. That doesn't tell me anything.

A. The driller is pulling the drill pipe up like this and the main valve is closed, and then, after you have pulled on up, and supposing the action of your equalizing valve is four inches, you have to pull it up four inches more before it is opened.

Q. Let me ask you this: What operation is necessary in order to close the main valve?

A. You have to pick the drill pipe up.

Q. Does that same movement open the equalizing valve?

A. Well, your Honor——

Q. Just answer that yes or no. Can't you?

A. Your Honor, I have to explain that just a little bit, I believe.

The Court: You will have to explain it a great deal. Can't you answer that question? You know what I mean

Does the same force or the same operation operate that closes the main valve and that opens the equalizing valve? Can you answer it?

A. I don't believe I can answer it unless I explain it.

Q. Then, go ahead and explain it.

A. If you pick up to a point where you close your main valve, your equalizing valve would still be closed, too.

Q. Then, your answer would be no, that is to say, that the action or the movement that closes the main valve does not open the equalizing valve?

A. No.

[fol. 624] Q. Then, what else do you have to do to open the equalizing valve?

A. You have to continue to pull your drill pipe up.

Q. A little bit further?

A. Yes; at least four inches.

Q. At least four inches further, and then the mere pulling of the drill pipe will open the equalizing valve?

A. Yes, sir.

Q. That is correct, is it?

A. Yes, sir.

Q. So after you have taken your test, after you have taken the contents of this "rat-hole" into wherever you want to put it, your test we will say is completed, and your next operation is to remove the apparatus from the well, is it not?

A. Yes, sir.

Q. Sometimes this packer is so firmly fixed down there that it is necessary that you equalize and that you restore the pressure below the seal?

A. Yes, sir.

Q. That is deemed good practice anyhow, whether it is absolutely necessary in all cases or not, I understand.

A. Yes. That is the principle of the tool.

Q. As soon as you have completed your test your business is to close that main valve?

A. Yes, sir.

Q. Which you do by raising up your drill pipe?

A. Yes, sir.

Q. Then by going a little further you open the equalizing valve?

A. Yes, sir.

[fol. 625] Q. Then what do you do? Do you pull away?

A. You continue to pull until your packer comes off of the seat.

Q. You pull up until something gives way?

A. Yes, sir.

Q. Or the whole apparatus comes to the surface?

A. Yes, sir.

The purpose in spudding is to get a firm seat. I wouldn't say that you have not a perfect seat before you begin to spud. This spudding business is merely a selection of the tester. If we want them spudded, we tell them to spud, and if we don't, we just set it down. Before attempting a test, we ordinarily look at the cores that have been taken. Some formations ~~are soft and~~ we can't spud in them, because to do so would be to drive your packer down the "rat-hole". So you can't spud in that kind of a formation. Any tester will say that that is right. So we don't spud. We just set the packer down, open the valve, and begin the test. I would say that it is a fair answer that in fifty per cent of the cases spudding is necessary, and we only spud because we feel that we haven't completely sealed off the "rat-hole" from the upper portion of the well. If you don't get a seal, the "rat-hole" is open to the fluid in the upper portion of the well. Each time you come down and open the valve you pick up from the "rat-hole" drilling fluid that has been let into it from the upper area. In fact, this whole thing is made necessary to find out what would be in the "rat-hole" if the drilling fluid was not pressing down on it. In making a test you first go down and set your packer into the "rat-hole" seat, in using the Johnston device. Upon certain occasions you spud to effectually seal off the drilling [fol. 626] fluid from above the packer from the "rat-hole" beneath the packer. When you come down first against the "rat-hole" seat you open the main valve of the Johnston device. The opening of that valve immediately lets into the chamber above the main valve, and between the main valve and the trip valve, a certain amount of fluid. When you are running your apparatus into the well to make a test, you first set the packer on the seat to fill the upper end of the "rat-hole". You do not spud the packer when you believe you have effectually seated your packer so that there is no leak between the upper area and the formation area in the "rat-hole".

The Court: Let me ask the witness a question.

Q. In this spudding does not the valve open, that is, the main valve?

A. Yes; when you let a portion of the weight of the drill pipe on the packer.

Q. You are bound to do that, aren't you?

A. Yes, sir.

Q. And the valve opens then whenever you spud, is that correct?

A. That is right.

After the packer is seated in the "rat-hole", if you wish to spud then you lift a portion of the weight of the drill pipe. You need not lift enough of the weight of the drill pipe so as to cause the main valve to close. If you do that, then you have taken out of the formation area the drilling fluid and other fluid that is contained there. If you haven't a good seat, when you come down again in the second spud you will open the valve and pick up that fluid again. Ordinarily, however, when the packer leaks once you just pull the tester out of the well as soon as you can. You have failed in making a test.

[fol. 627] By the Court:

Q. If however, you went through the operations and repeated the spudding, would it have the effect that Mr. Morgan describes and would it continue to take in that fluid? If you did it once, I don't see why you wouldn't do it again.

A. Well, it just wouldn't be a test.

Redirect examination.

By Mr. L. S. Lyon:

When you have once seated the packer and then raised the pipe to spud, the weight of the drilling fluid above the packer is imposed on the packer, and the raising of the pipe for spudding does not open up the packer or unseat the packer so that you let fluid above the packer flow down by the packer into the "rat-hole".

Erle P. Halliburton, called as a witness on behalf of plaintiffs, in rebuttal, having been previously sworn, testified as follows:

Direct examination:

Mr. L. S. Lyon: If your Honor please, I am going to ask Mr. Halliburton a very limited number of questions on this

He states that it can be used as a flowing device, which we now term an intermittent flowing device, in which he flows it off and the pressure fills up, and then they will open it up and let it flow, and it flows the oil out, and he closes it again, and in that case he uses the space above the oil and on the outside of the tubing as the reservoir to receive the gas, so that when the oil comes in the pressure of the gas causes the gas to extend and force the oil down and up through the tubing and out through the packing head at the top of the well. The packing head is gas-tight, to conserve his gas for the purpose of lifting his oil.

Q. Will you point in Figure 4 to the packer that corresponds to the packer that is referred to in the Franklin patent?

Mr. Boyken: I want to again make the objection, your Honor, that they are going outside of the patent and bringing in an argument here that seems to have been made in some other court with respect to this thing. I don't think it is proper examination.

The Court: This Figure 4 is something that you prepared yourself?

A. Yes, sir.

[fol. 637] The Court: And is your opinion of what the use of the Franklin patent was; is that right?

A. Yes, your Honor.

Mr. L. S. Lyon: And this particular figure was presented in the brief to the Board of Appeals in the Patent Office and was accepted by them in their opinion.

The Court: That doesn't cut any figure here, does it?

Mr. L. S. Lyon: It cuts some figure. Your Honor will want to know——

The Court: No; I think this is too remote, for the witness to prepare something and—of course, in a way it is an elaboration of his own testimony.

Mr. L. S. Lyon: It is illustrative only.

The Court: His explanation of the Franklin patent, but if we are going to go into it at all we may be showered here with diagrams from the other side as well, showing what they figure, so, for that reason, I think it is too remote. Any further questions?

Mr. L. S. Lyon: Well, I would like to offer, your Honor, to illustrate the witness' testimony with a copy of this same

diagram, which was presented to the Board of Appeals at the time the hearing was had by them which resulted in their allowance of this patent, and I am offering it merely to illustrate what he has already verbally explained, and that is, what he, as one skilled in the art, understands to be the way in which this Franklin valve would be arranged in a well.

The Court: Let it be marked for identification.

The Clerk: That will be Plaintiffs' Exhibit 19 for Identification.

(Book of Exhibits, p. 231.)

[fol. 638] By Mr. L. S. Lyon:

Q. Do you find in this Franklin patent, Mr. Halliburton, any description or disclosure of the method defined in either claims 8 or 18 of the patent in suit?

A. No.

"The Court: It is the understanding of the Court that the entire testimony of the witness, and particularly his interpretation of the patents, is objected to on the grounds originally stated, and that you have an exception to the admission of it.

Mr. Boyken: Yes. I was making the further objection that this is not a matter of opinion, but is really the witness' conclusion whether a thing is so or not, without stating any reason for it.

The Court: That is his interpretation of the claims, I suppose.

Mr. L. S. Lyon: You asked the same question of Mr. Abbett.

Mr. Boyken: No; I didn't ask it in that way."

Q. Do you find in this Franklin patent any disclosure of a device or apparatus corresponding to that defined in either of claims 9 to 17 inclusive and 19 of the patent here in suit?

A. No.

Mr. L. S. Lyon: Is there any question that your Honor has in regard to this Franklin patent?

The Court: Yes. The Franklin patent seems to be, on an enlarged scale, as far as the valves are concerned, identical with the patent in suit. Is not that true? In other words, the opening is half the size of the circle, while in the patent

in suit there are two small openings, but the closure is made [fol. 639] and the valve operated by the same means.

Mr. L. S. Lyon: They both turn in the same way to open the ports.

The Court: Yes. Now, so far as the valve is concerned, it would seem to be the same thing, as far as I can see. Obviously, though, it was for an entirely different purpose and was used under entirely different conditions. Now, I don't know whether that would make any difference or not. Just what was this device for? Was it to get a sample?

The Witness: No, sir.

The Court: What was it for, in brief?

A. It was intended to keep the well from flowing through the tubing while it was being pulled out. It was to take the place of a baffle plate, and had the advantage of also keeping oil from flowing——

The Court: Was it merely to close the tubing while the pipe was being pulled out?

A. Yes, your Honor.

The Court: As distinguished from the purpose of taking a sample?

A. Yes, your Honor.

Mr. L. S. Lyon: And there was no packer on the device to shut off drilling fluid.

The Court: I understand that: it was not for that purpose.

Mr. L. S. Lyon: There was no drilling mud there.

The Court: It is designed merely to close the well, to prevent oil or whatnot from flowing up into the casing?

A. Yes, sir. It was intended to keep the oil from flowing up, but not necessarily to retain it. In fact he didn't want [fol. 640] any oil in it. You can see that he wanted it to take the place of a baffle plate.

The Court: All right. That is all. Go ahead.

Mr. L. S. Lyon: I would like to turn now to the patent to Edwards. I have only one or two points on each of these patents that I desire to ask.

The Court: What number is that?

Mr. L. S. Lyon: That is No. 1,514,584, Exhibit H-16.

Q. Mr. Abbett has stated that this Edwards tester is a two-string tester. Do you know whether or not a two-string tester has proven to be a practical apparatus?

A. I know that they have not.

Q. What has been proven to be the final outcome of two-string testers?

A. I have never heard of one or known one to be used. You would have to haul out an extra string of pipe and a lot of apparatus that is unnecessary with a single-string tester, and the hazard would be so great that it would be safer to set a string of casing.

Q. What do you mean by "the hazard would be so great"?

A. By the time you run the one string of pipe and circulate and rotate and try to keep that free while you run another string in, you would have a difficult job. The mud fluid circulating back up would channel and would cause abrading and cutting around the collars and stick the pipe.

Q. Then, to your knowledge, a two-string tester has never proven to be satisfactory; is that correct?

A. Yes.

[fol. 641] Q. Are there any two-string testers being used today?

A. Not to my knowledge.

Q. Do you know what is used, what testers are being used in the oil fields?

A. I know that I don't know of a single soul that is trying to advertise a two-string tester. I know that every one who is in the business is using a single-string tester.

Q. Would it be possible in the operation of this two-string Edwards device, after you have lowered the pipe 8 to expose the perforations in the bottom of that pipe, to return that pipe so as to close those perforations and entrap a sample?

A. No.

Q. Will you explain to the Court why not?

A. In order to do that you would have to turn the tubing in the reverse direction from what you had turned it, to unscrew it, and you would also have to adjust your weight so as to get your threads started, and, with the mud and everything that the threads would be exposed to it wouldn't be possible. And the fluid would then rush in between the threads and on into the sleeve and into the tube. It would provide the packing 9 at the top of the sleeve to prevent fluid from coming down, but it doesn't provide any means of packing off and keeping the fluid from getting into the tube after he has pulled the tube up in the sleeve. In Edwards' attempt to commercialize the device he shows a

knock-out plug, and that he didn't intend to bring out an entrapped sample.

The Court: The evidence is that these types of testers are the only ones in practical use, that none other have had any practical use. I think that is the evidence.

[fol. 642] By Mr. L. S. Lyon:

Q. I will ask Mr. Halliburton to identify this page from the Oil Weekly for October 2, 1925.

A. Yes.

Q. Is that a page from the Oil Weekly, an oil field publication, in October, 1925?

A. No. It is a reprint from an advertisement carried on October 2, 1925.

Q. What has this got to do, if anything, with the Edwards patent that you are discussing?

A. This shows an advertisement of the Edwards tester, a commercial device, his so-called commercial device, as advertised in the Oil Weekly on October 2, 1925.

Q. Can you point out in that advertisement the feature that you have just referred to in your testimony as establishing that the Edwards device was not designed or intended to remove an entrapped sample from the well?

Mr. Boyken: Now I object to that question and move to strike out the previous answer, on the ground that it is immaterial, and, further, that this is a reprint of some other publication, which was dated, apparently, October, 1925, and it cannot be any better than this witness' own statement.

The Court: It is inadmissible on that ground, on the ground that it is a reprint.

Mr. L. S. Lyon: I am only using it to illustrate the testimony of the witness, your Honor, that has already been given.

The Court: Objection sustained.

Mr. L. S. Lyon: I would like to have the witness, for the purpose of the record, just point out, subject to our exception, point out at this point, and then have this filed for identification. [fol. 643]

The Court: Very well. You may do that.

The Witness: Point out what?

By Mr. L. S. Lyon:

Q. You said that by reference to this attempt to commercialize the Edwards device, that embodied a knock-out plug, which demonstrates that the Edwards device was not intended to or adapted to receive an entrapped sample. Just point that out in this publication.

A. Yes. There is an arrow pointing to what is illustrated as a plug in the tubing, which is referred to as a knock-out plug, and on the reverse side of this sheet it illustrates how the test is made and how the go-devil is dropped in to knock out this plug, to get the sample. The device does not show a sleeve or anything that could be used to close the tubing after the sample has entered the tubing.

Mr. L. S. Lyon: We will offer this illustration which the witness has last referred to for identification as plaintiffs' exhibit.

The Clerk: Plaintiffs' Exhibit No. 20 for Identification.

(Book of Exhibits, p. 232.)

By Mr. L. S. Lyon:

Q. Now, will you refer to the patent to Cox, No. 1,347,534?

A. Yes.

Q. Do you know Mr. Cox?

A. Yes.

Q. Is this device a two-string tester?

A. Yes.

[fol. 644] Q. Is it adapted to recover an entrapped sample?

A. No.

Q. Why not?

A. Because valve 15 would permit fluid to rush into the inner tube when the packer was unseated, forcing the sample, if any was in the tube, on up to the top of the pipe. It was the practice to keep the casing full of fluid, and in the case of Cox he would be circulating fluid while he was making a test, which would keep the well full of fluid, and when he lifted his packer off of the bottom the fluid would equalize within the inner tube, and by keeping the outside of the well filled with mud fluid, the mud being heavy enough to come into the tube, it would force the sample up through the tube, erhaps to the top or someplace, and you never would know how much of the fluid within the tube came from the formation and how much was the mud fluid.

Q. You have examined all of the prior art patents and the publications that have been offered in evidence by the defendants, and you are familiar with them?

A. Yes.

Q. Do any of them describe the method defined in claims 8 and 18 of the patent in suit?

A. No.

Q. Do any of them describe an apparatus such as defined in claims 8 and 18 of the patent in suit?

A. No.

Q. Do any of them describe an apparatus such as defined in claims 9 to 17 and 19 of the patent in suit?

A. No.

Mr. L. S. Lyon: I don't think I am going to take the time of the Court to go over that, if counsel——

[fol. 645] The Court: All right. I want to ask the witness a question here. The packer as represented in this Edwards patent——

The Witness: You mean the Cox patent?

The Court: This one I am looking at now. The Cox patent, No. 1,347,534——

A. Yes, sir.

The Court: Is that shaded portion there?

The Witness: Yes, the dark shaded portion is the packer.

The Court: How are they equipped to increase its size so as to insure a seal?

A. Your Honor, if operated in accordance with the patent it most likely would seal off that plunger that is supposed to pierce the formation, along with the formation.

The Court: But is it shown how the patent is a good patent and will work the way he thinks it will work? What are his means for insuring a seal here?

A. You see, he just sets that down on the bottom of the well. He doesn't provide a "rat-hole." If he did, the packer might slip down in the "rat-hole."

The Court: Well, I would think so. What is that packer made of?

A. He describes it as a rubber packer.

Cross-examination.

By Mr. Boyken:

Q. Let us take the Franklin patent up first, Mr. Halliburton. Now, that is entitled "Device for controlling and regu-

lating the flow of oil wells." Now, what does that mean?
[fol. 646] A. That means a device in which you can shut off the flow. You might say the same thing of a baffle. It controls it, keeps it from flowing.

Q. In other words, there is sufficient pressure to enable that well to flow, and this is a device for regulating such flow?

A. He doesn't describe it as sufficient pressure at all times.

Q. What causes a well to flow?

A. Well, we will take the gas that is associated and the porosity of the oil sand, and the gas is the energy that removes the oil from the sand, and in the sand it is usually in solution and comes out into the well, and it expands and lifts the oil out of the well with it, due to its greater velocity as a result of its lightness.

Q. Well, whatever the reasons are, there is sufficient force to cause the liquid to flow upward out of the top of the well; is that right?

A. Well, a well that flows at the top of the well, yes.

Q. So that if it flows out of the top of the well there is some force to send the liquid upwardly to the top of the well?

A. Yes; but we are taking a well that flows by heads, doesn't have sufficient energy released to cause continuous flow, but it will accumulate energy and flow by head.

Q. So this is a device for controlling such flow, is it not?

A. Well, yes. He states, to keep it from flowing when he is inserting it in the well, that the gas will keep disk D seated up against c, and when he is taking it out it will do the same thing, and when he has got it in the well he can [fol. 647] close it with the gas holding disk D up against c.

Q. You need not go into that right now unless it is necessary for some explanation. This is a device for controlling the flow of an oil well; is that correct so far?

A. Yes.

Q. Now, the Franklin device, according to the patent, may be inserted in the well; is that correct?

A. Yes, or out of the well.

Q. Out or in?

A. Yes.

Q. Now, let us take a case where it is in the well.

A. All right.

Q. There is a statement, commencing at line 48 of page 1, reading as follows: "My device has to be operated manu-

ally, but it may be placed deep in the well, and thereby obtain considerable advantage." Now, let us assume that case, where the device is placed deep in the well. This patent also mentions a packer, does it not? I call your attention to page 1, line 16, where it says, "but preferably within at a point above the packer." Now, let us assume this device is put deep into a well at a point above the packer. Now, in such a case what would be the object of having the packer there?

A. Well, the object would be to keep the water shut out of the well.

Q. That is, the water from above?

A. Yes.

Q. From coming down underneath the packer?

A. Yes.

[fol. 648] Q. And therefore you could obtain whatever fluid there was under the packer, you could obtain that by allowing it to flow up through the device?

A. Franklin didn't intend his device to be used that way. The water would run in between part B and part C. He didn't intend that his device be placed in water or oil.

Q. Well, I am not asking you what his intention was, but I am just asking you certain questions with respect to this structure. Let us assume this Franklin device in a deep well, and the device set above the packer. You say in such a case the packer would keep the water above from entering into the fluid below?

A. I am speaking of the packer on the casing.

Q. Any kind of a packer. This patent doesn't limit the packer to the casing, does it?

A. It doesn't say it is on the tubing.

Q. Well, it doesn't say whether it is on the tubing or on the casing, does it?

A. No, it doesn't say.

Q. Let us assume that the packer is deep down in the well and that the device is above the packer. In such a case the packer keeps the water from above from entering into the fluid below; is that right so far?

A. Yes.

Q. According to that portion of the patent from which I read, respecting the packer, it says that the device is connected with the tubing of the well above the packer, does it not, Mr. Halliburton?

A. The way I read that, it would seem to me that the packer was already in the well.

[fol. 649] Q. Well, it is below the valve, at any rate?

A. Well, it says this: "My invention relates to devices for regulating or controlling the flow of oil wells; and it consists in providing a device which can be connected with the tubing of the well either within or without the well, but preferably within at a point above the packer." In other words, the packer is already in the well. He would prefer to put it in the well and above the packer in the well.

Q. And the tubing goes through the packer, does it not?

A. The tubing goes through the packing and the packing head at the top of the well.

Q. I am talking about the packer which packs off the formation, that is, keeps the liquid from above from going below. Ther is a tube that passes through the packer, isn't there?

A. It appears from the patent that the packer is already in the well before you run this device or the tubing in the well.

Q. What is the object of a packer? It is to separate the fluid from above from that below, is it not, as we know the term packer. Let us get away from this Franklin patent a moment.

A. In the case of these testing devices the object of the packer is to exclude the fluid from above the zone to be tested from that zone.

Q. Yes, and there is a tubing or opening within the packer, is there not?

A. There was an opening through the pipe which the packer was attached to.

[fol. 650] Q. At any rate, now let us go back to the Franklin patent, if that is your best answer. Suppose we have the Franklin device set down into a well hole and the device located at a point above the packer. In order to cause that well to flow in the Franklin device you rotate the pipe, which opens the valve, does it not?

A. Yes.

Q. And you would open it, and then when the pipe is rotated and the valve opened, the liquid underneath the packer flows upwardly through the pipe, and if there is sufficient pressure, to the top of the well hole?

A. That would be one advantage of putting a packer on it, if there is sufficient pressure.

Q. That is sufficient for my purpose.

A. Yes.

Q. All right. Now, we have a flowing well, with the Franklin device. Suppose the pipe is rotated so as to close the valve——

A. Yes.

Q. Then you have a column of fluid, have you not, from the valve up as high as the top of the well?

A. Not necessarily so. A well will flow with—that is, a well will flow through a string of tubing and have very little oil in it. The gas carries the oil as fast as it accumulates under it.

Q. I am not talking about that. Whatever fluid there is that goes upward through your device, if you close the valve that fluid will be entrapped and extend from the valve substantially to the top of the well?

A. Yes; if it is oil and gas it will flow right on out.

Q. And if it is other fluid it will remain in that pipe?

A. Yes.

[fol. 651] Q. Now, suppose you pull up on the pipe, that is, remove the device from the well hole, with that column of fluid in there, then as you take off the drill pipe at the top you have that entrapped fluid from above the valve up to the top of the well, haven't you?

A. How much fluid is above this packer and where is your packer——

Q. I am not talking about the packer at all. I am talking about the valve after it is closed in a flowing well, and you have closed the valve, and you have the column of fluid in the drill pipe from the valve up to the top of the well, haven't you?

A. Yes.

Q. Do you understand that situation?

A. Yes.

Q. Suppose you draw up on the drill pipe as you do in a testing device of today.

A. Yes.

Q. You have that column of fluid in there, haven't you, which you gradually can take out of that drill pipe as you draw up from the position of the valve in the well?

A. I don't know. I am not so certain that it wouldn't leak out through this.

Q. You think it will leak out?

A. I know it will unless that is full of fluid heavier than the fluid within the tubing.

Q. Then the only reason that you can't take out this column of fluid is that it would leak out; is that so?

A. No. Franklin didn't design this so that you could bring out an entrapped——

The Court: Answer the question, please. Read the question to the witness.

[fol. 652] (Question read by the reporter.)

A. Yes; it would leak out and defeat the purpose that is taught in the patent.

By Mr. Boyken:

Q. It would leak out?

A. If it didn't leak out it would defeat the object of the patent.

Q. Well now, what causes it to leak out—the fact that the valve doesn't close properly?

A. The fact is that plate D will drop down from c and leave an opening, so that the fluid can run out.

Q. You mean between the two portions of the valve, that there would be an opening there?

A. Yes.

Q. Doesn't Franklin show a casing around that, a casing all the way around that valve?

A. He doesn't show any casing that wouldn't leak, and he does intend it ~~to leak~~.

The Court: Doesn't what?

A. He doesn't show anything to keep it from leaking, and even if it didn't leak, as long as there was play or an opening between D and c, as he states in his patent, the fluid could pass down through the hole in c, the half-circle hole in c, and then cross over and through the half-circle hole in D, since it appears that he depends on the gas to hold them up together, so that it won't flow, and if the gas pressure or any pressure was on the inside it would force D down and the fluid would run out.

Q. When you said it would leak did you take into consideration, Mr. Halliburton, the statement in the Franklin patent at page 2, commencing at line 18, reading as fol-

lows: "This relieves the disk D of the weight of the [fol. 653] tubing, and when the device is closed the pressure of gas keeps it seated on the part c above it, so that there will be no leak, and the tubing can be easily turned the half-turn necessary to open or close the valve"?

A. I certainly did. He said the gas would hold D up against c.

Q. In other words, he doesn't want any leak there at that point?

A. The purpose of his device was not to bring out an entrapped sample, but to keep the well from flowing. He didn't want any oil in the pipe. He wanted it to take the place of a baffle plate.

Q. Let us go back again. Mr. Franklin, as expressed in his patent, did not want any leak at the point where you say the valve would leak?

A. He wanted all the oil to run back out, and he provided play there so that any that was in the pipe could get down by, so that the gas would keep D up against c, so that it would not flow or have any oil in it as he withdrew his tubing from the well.

The Court: This device is for regulating the flow of oil wells. It will be lowered into the well. It can be opened or partially opened or closed, as the case may be, and plainly will regulate the flow, when the pipe fills the well, which will be effected by the packer, as I understand it. Then we will assume that they have regulated it sufficiently, and then they withdraw the pipe, and Mr. Halliburton says that they don't want the sample or the contents that runs in while the valve is open to remain in the pipe while it [fol. 654] is being withdrawn. That is your statement, isn't it?

A. Yes, your Honor.

The Court: Then what is this for? What is the object of the whole device—to cut down the flow of the well, for instance?

Mr. Boyken: No, your Honor. In substance it is for the same purpose as the patent in suit. That is our contention. The object of the packer is to build up pressure underneath, and whatever fluid there is in that restricted area below the packer flows upwardly through the passageway, that is, the passageway through the packer, then up to the valve,

and if the valve is open it flows through the valve and up to the top of the well. That is a flowing well.

The Court: Is there anything in the patent which says the packer is to build up pressure?

Mr. Boyken: No there is not. But the packer is mentioned here, and, according to the other publications and patents in this suit, the object of the packer is to seal the formation above from below, and in this case pressure is built up underneath the packer, so that it may go upwardly through this pipe, and that is the reason there is a valve here, to regulate and control the flow that comes out through the pipe.

The Court: So that they won't get too much oil or too little oil?

Mr. Boyken: Yes; or to shut it off altogether.

The Court: There is no suggestion in the patent anywhere that the purpose is to get a sample?

[fol. 655] Mr. Boyken: No, your Honor. And in the Simmons patent in suit there is a statement that the preferred form is to have a flowing well, not the entrapping of a sample which remains in the pipe, but it says a flowing well.

The Court: Well, if the well is flowing, then the most of this comes from the formation, doesn't it?

Mr. Boyken: That is very true. It comes out of the top and they get their sample in that way. It comes out of the top and through this.

The Court: Why use the testing apparatus at all if they can do that?

Mr. Boyken: There is not always enough pressure below there in order to have the well flow because you have in the modern practice this column of mud which keeps the liquid to be tested back in the formation. It is only when that is relieved that the well commences to flow.

The Court: They use it while they are drilling to find out what they are getting?

Mr. Boyken: Yes. They can do it at that time.

The Court: I must confess I am a little bit confused about this Franklin patent. In Figure 2 I notice A[1]. That means, I suppose, the space within the pipe.

Mr. Boyken: That is the drill pipe from the valve portion to the top of the well hole.

The Court: Do you agree that there is no object in taking to the surface of the ground the contents of A^1 or the contents of that pipe after the valve is closed, that is, the chamber allowed to fill and then closed?

Mr. Boyken: If there is sufficient pressure at the bottom so that there is a continuous flow of liquid through the valve to the top of the well, you get your test in that way if [fol. 656] you desire to make a test. There is no need of taking any further sample. But, if the pressure is not sufficient, so that the flow does not come over the top of the drill pipe that is at the head of the well, then you may obtain a sample in this Franklin device.

The Court: The Franklin device is used in a well that ordinarily has no casing in it, is that correct?

Mr. Boyken: I don't know. It is of a rather early date and I don't think that the casing part has been considered in the statement of the patent.

The Court: All right. Now if you want to make any observations, you may make them.

A. Well, your Honor, these plates D and c and all of the numbers between, b^2 and b^1, can move vertically and any fluid that would be on the outside of the tubing can run into the valve and the valve will not leak when the gas holds the plate D up against c. But when there is fluid in C and a less pressure against D the fluid then can run down through the opening, the half opening in c and then between the plates here and the opening in D and on down through the well tubing below.

The Court: All right.

A. That is stated at line 13 on page 2, "Between the shoulder b^2 and the flange b^1 there is enough room to leave but very little play vertically to the parts lying between." He means the parts b and c. And, if there is vertical movement of those parts, then certainly fluid can come down between the opening between b and c and around the shoulder b^1 and in between the plates c and D and move either up or down in the tubing.

[fol. 657] By Mr. Boyken:

Q. I call your attention to page 2 of the patent, line 32. "The disc D may be attached solid to the part B." Let's stop there. When you make the disc D solidly attached to

the part B there wouldn't be that space that you complain of, would there?

A. Yes, because it states up here at line 13, "Between the shoulder b^2 and the flange b^1 there is enough room to leave but very little play vertically to the parts lying between." It wouldn't make any difference if it was attached or not. He leaves room there for vertical play.

Q. When you have that vertical play, if you want to prevent the valve from leaking, what would you do?

A. I would go and get another valve, another one that wouldn't leak.

Q. How would you fix this one to prevent it from leaking?

A. I would do whatever the defendants did to it to keep it from leaking.

Q. Then, what would you do?

A. I most likely would—well, I wouldn't know what to do. You would have to fix an adjustment on it so that you could adjust those parts to a certain tension. That is one of the things you would have to do. And, in addition to that, you would have to put in packing glands, a means for packing it, and under the construction of this device in Figure 4 you would have to substitute something for a stop there in order to get a gland in.

Q. Suppose the discs B and D are solid, that is, together. Just take that much. There wouldn't be any of this leakage that you complain about, would there?

A. What parts are those?

[fol. 658] Q. I am calling your attention now to page 2, line 32, which reads as follows: "The disc D may be attached solid to the part B." Suppose the disc D is attached solid to the part B. Then this leak that you complain of would not occur, isn't that so?

A. Franklin doesn't show how you could attach the part D to the part B.

Q. Just answer the question. Suppose that was solid as I have just read to you. That leak would not occur, would it?

A. I wouldn't know how to make it that way.

The Court: That is not the question. The question is suppose it was. What then?

A. If there was a play between b^2 and b^1, it would leak from the outside.

By Mr. Boyken:

Q. You are getting away from the question. I call your attention to line 32 of, page 2, where it says, "The disc D may be attached solid to the part B." Now, I am asking you, if the disc D is attached solidly to the part B, this leak that you complain of would not occur, would it?

A. I don't know how he means to attach it. I would have to know how to attach it. The part D now is fitted in to a shoulder on B, and, even though it was welded there, as long as there was vertical play between C and D it would leak even though it was welded and became a part of it.

Q. If it was attached, there wouldn't be any vertical play between those two parts, would there?

A. I see no reason why c could not move up and down even though D was attached.

[fol. 659] Q. I am not talking about that. I am talking about the attachment now of D and B, that is, the disc D and the part B, that attachment.

A. Yes.

Q. Now, if those two parts were attached, there wouldn't be any leakage between them, would there?

A. Do you mean around the shoulder at b^2.

Q. This leakage that you have been complaining of.

A. I haven't said it leaked around the shoulder at b^2.

Q. Where did you say it leaked?

A. I say it comes around b^1 from above, leakage from the outside, since there is vertical movement between b^1 and b^2.

Q. Will you state again where you think the leakage would be?

A. Well, as it is now constructed fluid can leak from above down through the device. It can leak from the outside of the device between C and B, on past the shoulder b^1 and between the disc D and the disc c. And, if D was welded to B, the fluid could still leak. If you held the device up by its upper end, the fluid could still leak from within the tubing down between C and D, and it could also leak from the outside around b^1 and in between the two discs so long as there is provided room for vertical movement of the parts.

Q. According to the paragraph just preceding the one that I called your attention to, which, in part, in line 27, reads as follows: "the device can be kept closed while the tubing is being put into the well and then opened, and can

be again closed when the tubing is to be drawn,'' it is Mr. [fol. 660] Franklin's idea, as expressed there, to close this device and to open it at various times, is it not?

A. He states that the gas——

The Court: Answer the question.

A. Yes.

Q. But your contention is that he couldn't do that?

A. No, sir, your Honor. My contention is that he could lower it against gas pressure——

Q. I am not asking you what your contention is in other respects. Your contention is that he could not close it?

A. Yes, sir; he can close it.

By the Court:

Q. If he can keep it closed, it will not leak, is that correct?

A. Well, your Honor, the gas pressure keeps it closed.

Q. Never mind that. Just answer the question.

A. Yes.

Q. If he would keep it closed, it wouldn't leak?

A. Yes.

Q. All right. That is all I wanted to know. Your contention is that it is impossible to keep it closed?

A. No, your Honor.

Q. That there is play there which will make it impossible for him to keep it closed?

A. No, your Honor.

Q. Then, I don't understand what your contention is.

A. My contention is that as he lowers it in the pressure of the gas against D keeps the plate D sealed against c.

Q. Here is the portion of the valve. That is a portion of the valve.

A. Yes, your Honor.

[fol. 661] Q. And that is not fixed to the pipe. At any rate, this portion of the valve C moves upon this portion of the valve D when you open it, is that right?

A. If the pressure is holding up against——

Q. Never mind that. I am merely going to open this valve now.

A. Yes, sir.

Q. This part C must move upon this until the openings coincide?

A. Well, no. Sometimes those parts do not touch.

Q. The openings must coincide before the valve is opened, must they not?

A. Yes.

Q. All right. How can they coincide unless the one part moves upon the other, moves with respect to the other?

A. It can move with respect to the other but D does not necessarily touch c.

Q. It doesn't?

A. No, under certain conditions. Unless there is a gas pressure to hold D up against c, it doesn't even touch it.

Q. In order to close it it has got to touch it, has it not?

A. Well, then it would only close and make——

Q. Just answer that yes or no. In order to close it the two parts must touch?

A. Yes, your Honor.

Q. Now, you say that the only thing that could close it is the gas pressure from below?

A. Yes.

[fol. 662] Q. Then, when the device is hoisted that gas pressure may not be sufficient to keep it closed, is that correct?

A. That is true.

Q. And then the valve would be open?

A. Yes.

Q. Not, of course, open in the sense that it is described in Figure 2?

A. Yes, your Honor.

Q. It would?

A. I mean it would not be open. I agree with you.

Q. For once we agree. But why wouldn't it be closed tight enough so that the liquid above could not escape?

A. Because there would be a space or an opening between them. The weight of the fluid would hold B down on the shoulder b^2 and then the fluid could run out unless there was a greater pressure below to hold D up against c.

Q. Where is that place where there is a play that you have spoken about?

A. The play is the part c and D between the shoulder b^1 and the shoulder b^2.

"The Court: Isn't there testimony in this case that this device was actually used?

Mr. Boyken: Yes, your Honor. We made a full-sized model in accordance with the disclosure of the Franklin pat-

ent and that full-sized model is in evidence here and was actually used.

The Court: According to the testimony of some witness?

Mr. Boyken: Yes; evidence of disinterested witnesses.

The Court: For the purpose of making a test, was it not?

[fol. 663] Mr. Boyken: Yes; just to overcome this point of leakage that Mr. Halliburton has referred to; and the test showed that the device was successfully operated.

The Court: In order to operate it successfully a necessary consequence would be that it did not leak in the manner described by the witness.

Mr. Boyken: That is only common sense."

The Court: I am sure I am in some confusion caused by my inability to understand or to interpret even this enlarged figure here. I will ask a few more questions of Mr. Halliburton.

Q. The point that I have my pencil on is not given a letter, is it, anywhere in this?

A. Yes, your Honor.

Q. Where?

A. That is C.

Q. I am referring now not to the interior part of the pipe but to the pipe itself.

A. Yes.

Q. I mean the iron or steel pipe. That is C, is it?

A. Yes.

Mr. Boyken: It is a part of this here.

By the Court:

Q. When the valve is open what is there at the lower end of C, where I point my pencil?

A. When the valve is open?

Q. Yes.

A. The weight——

Q. I am not asking you about weight. This is what I mean: You notice here D is given apparently to this entire portion from this point over to here.

A. Over to there.

[fol. 664] Q. I thought this was an open space.

Mr. Boyken: Just half of that is open. We have a little model here of it somewhere.

The Court: Yes. I understand. Now, you contend that there is a space between C and D?

By Mr. Boyken:

Q. Is that where the space is that you have indicated with your pencil?

A. There is a space between b^1 and C and there is a space between the outer circumference of C and D and B, and there is a space between the shoulder on B and the shoulder on b^1. So that D and c can move vertically between these shoulders at b^2 and at b^1.

Q. How far could they be moved vertically as shown in this drawing, Figure 1?

A. Perhaps a sixteenth of an inch. That is not a detail drawing. It would be a space of about a sixteenth of an inch.

By the Court:

Q. According to that oil forced upward through the pipe could run around there and out and back to where it came from again, could it not?

A. It could get out around and out on the outside, yes, your Honor, but not up through the tube.

Q. Of course, not up through the tube. Would the packer have any effect on what became of that oil that might leak through that place?

A. Do you mean if the packer was on the tubing?

Q. Yes.

A. Well——

Q. Might it stop it from running back to where it came from, do you think?

A. Yes. It would keep it from running back down into the well. It would seal it off.

[fol. 665] By Mr. Boyken:

Q. Let's take the other case where the valve is now closed and you have a column of liquid extending from the valve up to the top of the well.

A. Yes.

Q. And you are then removing your drill pipe with the valve?

A. Yes.

Q. Do you think, then, there would also be some leakage and you would lose your sample?

A. If the device was constructed according to the specifications, there would be vertical movement between D and c and it would leak.

Q. You have examined the full-sized Franklin model that is in evidence here, have you?

A. Yes, sir.

Q. And concerning which the witnesses have testified?

A. Yes, sir.

Q. Have you any criticism of that?

A. I don't know whether it is made in accordance with the teachings of Franklin or not.

Q. Haven't you looked at it?

A. Yes. But I haven't had any wrench whereby I could break it up to see whether there was play in between the parts, between the shoulder b^2 and b^1, as provided for in the Franklin patent. I don't know whether the device is made in accordance with the patent or not.

"The Court: All of this controversy arises over whether or not the Franklin device can raise an entrapped sample to the surface, I believe.

[fol. 666] Mr. Boyken: That is very largely the point. That is the primary point.

The Court: All right.

Mr. Boyken: And, as I understand the witness——

The Court: He says you can't by reason of this liability or opportunity to leak.

Mr. Boyken: That is the way I understand his testimony.

The Court: All right."

Q. Is that the only reason you can't bring that entrapped sample to the top of the well when you withdraw the pipe?

A. No. I think, if you ran the Franklin device in and set a packer, that is, set your packer, then, when you opened the device, even though it didn't leak while you ran it down the well, the fluid then would run from the outside into the inside of the tubing from above the packer.

Q. Suppose you had your device in a deep well and you had a flow through the device so that the liquid from below would flow over the top of the well, and you then closed the valve, in that event you would have a column of fluid from the valve to the top of the well. Now, in withdrawing that device from the well the only reason you might lose that sample, as I understand your testimony, is that the valve would leak and the sample would leak out through the portion you have pointed out?

A. No. The fluid would run into it down around that shoulder b^1 and spoil your sample if it had mud fluid in it.

[fol. 667] Q. I am talking about the sample you had in the pipe from the valve up to the top. That is the sample I am talking about.

A. I couldn't answer that question without knowing something about the kind of fluid that is on the outside of the device and up to the top of the well.

By the Court:

Q. In any event, your objection would be that the fluid from the outside would run in and thereby be deleterious to the sample?

A. It would if it was used as a testing device; yes, sir.

By Mr. Boyken:

Q. And I presume the fluid inside might run out, too?

The Court: He has already said that.

By Mr. Boyken:

Q. And that is the same leakage we have been talking about, isn't it?

A. It all depends on where the fluid is on the outside of the device and the pressure of it.

Q. Let's pass on to something else. In order to operate that valve you rotate the pipe in the Franklin tool, do you not?

A. Yes.

Q. And you rotate the pipe in order to open the valve, and you rotate the pipe in the opposite way in order to close the valve?

A. Yes.

Q. Do we agree so far?

A. Yes.

Q. What different problem is presented in putting this Franklin device down into a well hole as known in the year 1882 from putting a device such as this down through rotary mud as we know it today?

Mr. L. S. Lyon: For what purpose?

[fol. 668] Mr. Boyken: Let's see what the witness says.

A. Read the question, please.

(Question read by the reporter.)

A. Do you mean just lowering it into the well?

Q. This Franklin device may be put into the fluid of the well, may it not?

A. It doesn't say anything about it.

Q. It can be used for that purpose?

A. Yes.

Q. Now, what fluid would that be?

A. It might be oil, in accordance with the patent.

Q. And it might be what else? Might it be water?

A. It doesn't say so.

Q. Well, may it be water?

Mr. L. S. Lyon: I don't think that is a proper question.

The Court: The objection is overruled.

By Mr. Boyken:

Q. You said it might be oil. Now, tell us what else it could be.

A. I can't think of anything but oil because he says it is a flowing well and a flowing well wouldn't have anything else in it.

Q. What would be the object of a packer in it? Wouldn't that be to keep other fluids away from the oil?

A. The object of the packing would be on the casing to keep the water out of the well.

Q. I was asking you whether there was any different problem presented in putting a device of this kind through rotary mud today from what it was in the year 1882, when the Franklin device was put downwardly in the well through the fluid that may have been present in the well.

[fol. 669] Mr. L. S. Lyon: I object to that. It is not complete. We don't know what kind of a well this is being put into and we don't know for what purpose.

The Court: The objection is overruled.

Mr. L. S. Lyon: An exception.

A. Well, you could put it on a string of pipe and run it into a well now the same as you could then.

By Mr. Boyken:

Q. I am asking you if it makes any difference whether the fluid through which this is lowered is rotary mud or some other kind of fluid.

A. It would depend on the purpose for which you were lowering it.

Q. Suppose you were lowering it in order to obtain a device for controlling and regulating the flow of oil wells, as stated in this patent.

A. Then, you wouldn't run it in one containing rotary mud because a flowing well does not contain rotary mud.

The Court: I have a criticism of your answers, Mr. Halliburton. I don't want to do you any injustice at all but it strikes me that you lack a little bit in frankness and directness. Now, just say yes or no. This case is not going to depend on any one question nor on argument while you are on the witness stand. Counsel, as I understand it, wants to know in what way the operation of this device, as described in the patent, would differ from its operation today to obtain a sample below.

Mr. L. S. Lyon: That is not what he asked

The Court: Well, that is the court's question, and answer that question. Do you understand what I am asking?

A. Yes, your Honor.

[fol. 670] Q. All right. Then answer it.

A. You would have to put a packer on it. That is about the only problem.

Q. Apparently a packer is mentioned here.

A. But the packer is not on this device. The packer is on the string of casing.

Q. Suppose that it was the only thing in the well. Suppose that it was down in a well that didn't have any string of casing in it.

A. Yes, your Honor.

Q. Would the action, as described in the patent, be any different from your patent which takes these samples?

A. Do you mean you can have a packer below the device to hold the water back from the formation being tested?

A. Yes; to hold the water or whatnot above it.

A. That is the very reason I don't believe he intended——

Q. No. I don't want what he intended. That question may not be intelligent. Is there any difference? What I want to know and what I have had in my mind for some time is what difference is there between this Franklin device and the device in the present case. I don't mind telling you that. Apparently the device in the present case is lowered into the well and the pressure in the bottom is lessened by reason of

this packer. The fluid from the bottom from the "rat-hole" goes on into it. In this case the same thing takes place, not for the same purpose at all, I suppose, and not under the same conditions because they have no mud in the well and no fluid.

Mr. L. S. Lyon: What would they put the packer in, then, for?

[fol. 671] The Court: Don't start to questioning me because that is not what I am after. I am after information.

Q. They put a packer here. Whatever that packer is for I don't know. In fact I don't know that it is shown by the patent but certainly it is for some purpose. But suppose they did have a packer just the same as the packer in your device.

A. Yes.

Q. Suppose they had that on this?

A. Yes.

Q. And you took the sample up and got it into that upper tool. Now, regardless of whether it would leak out or leak in or be hoisted to the surface or not, is the operation of your tool or your device essentially different from this?

Mr. L. S. Lyon: Why, certainly.

A. No. I would say, if you put a packer on that and ran it in the well and operated it the same as these testing devices are operated, that it would perform the same as this.

The Court: That is just what I want to know. It seems to me that that is the case. Now, whether that has any effect on this case or not, I am not saying and I am not mentioning an opinion because I have none. But, nevertheless, it seems to me that this valve is essentially the same device as the valve in the patent in suit.

Mr. L. S. Lyon: Of course, your Honor, if you are going to make all of the assumptions you make and refuse to allow us to show they are not justified, you can't reach any other conclusion.

The Court: And another question. Suppose this man back in 1882 made this device and it was successful for his [fol. 672] purposes, which was not to test an oil well at all; that he never thought of the necessity of that; that he merely wanted to regulate the flow; to make it stop or hold it down or flow or what not or to stop it altogether. Suppose that

he showed everything that is shown in the plaintiff's patent. Would the fact that he was using it for an entirely different purpose have any effect upon the situation?

Mr. L. S. Lyon: Yes, your Honor. In the first place, even if exactly the same apparatus had existed in the prior art, if no one had previously taught the practice of this method of using it for testing, then the method claims would in no manner be hindered by this earlier device. But the question might be different as to the apparatus claims.

The Court: Let me ask this further. Suppose, we will say, that Halliburton took the identical thing which Franklin had used for an entirely different purpose and claimed an invention for this purpose. That would be invention, would it?

Mr. L. S. Lyon: The method claims would still be good but the apparatus claims might not be. That is the question.

The Court: All right. I am not at all satisfied with that leaking proposition and I am not at all convinced one way or the other, and I would like to take time to examine that device that has been put in testimony.

[fol. 673] By Mr. Boyken:

Q. At the hour of adjournment last night, Mr. Halliburton, we were discussing your criticism of the Franklin patent, and that you thought that the valve would leak. Is there any statement in the patent to that effect that Mr. Franklin intended that the valve should leak?

A. No.

Q. Is that your opinion concerning the structure that is there shown?

A. Yes. My opinion is this, that, if the device is constructed in accordance with the teachings of the Franklin patent, it will leak.

Q. You do find in the patent several statements to the effect that Mr. Franklin intended that valve to close, do you not?

A. Yes. Franklin states that——

Q. Look at page 1, for instance, commencing with line 31, reading as follows: "but this is of no service in keeping the tubing closed while drawing it, and, indeed, there is no device to my knowledge, except my own, which will close the tubing while it is being drawn." That is a statement to the effect that Franklin intended that valve to close, is it not?

A. Yes. And on the second page, at line——

Q. Just a moment. I didn't ask you about any other part. I am asking you about that statement that I just read. That is a statement to the effect that Mr. Franklin intended this valve to close, is it not?

A. Yes. But he also tells how it is closed in another part of the patent.

The Court: He also tells what?

A. He tells how the valve is closed in another part of the patent. He states——

[fol. 674] By Mr. Boyken:

Q. I am not asking you for that unless it is necessary for your previous answer, to explain it. Now, let me call your attention again to page 2, commencing at line 24. "It will be seen that my device can be operated from the top of the well by turning the tubing, as stated above; that the oil can be shut off by it or allowed to flow at will." Now, if you shut the oil off, Mr. Halliburton, doesn't that mean that the valve closes?

A. Yes; he means that he closes it against the entrance of oil into the tubing. Just above where you read he says, "This relieves the disk D of the weight of the tubing and when the device is closed the pressure of gas keeps it seated on the part c above it so there will be no leak."

And just turning and closing it doesn't necessarily mean it won't leak. He means he has to have the pressure of the gas to hold the part D up against c or it would leak.

Q. Aside from this patent, what do you think the expression means, to close a valve?

A. Well, it would depend on what valve. In this particular valve he means the turning——

Q. I am asking you for your opinion on that, irrespective of the Franklin patent. I want to know what the expression means, to close the valve. Does that signify that the valve is only partially closed?

A. No. It means that it is closed against movement of fluid through the valve in either direction, unless you define the type of valve.

The Court: Now, the valve, we will say, is closed. As I understand the witness' statement, he concedes that the

[fol. 675] valve can be closed, but he says that above the valve it leaks out. Is that correct? I am afraid to start you, because you are rather lengthy. You just stated that when the valve is closed no more oil can get up through it; that is correct, isn't it?

A. Yes.

The Court: All right. Now, there is a packer, and no more oil can get up through the packer, and therefore no more oil can go up through the well. Do you understand what I have in mind?

A. Yes.

The Court. Here is the pipe, and the valve is in that pipe, and the packer is down here somewhere. It doesn't make any difference whether it is down or below, for that matter. No oil can go up around this. But you claim that although that valve may be closed as tight as it can be that the contents of the pipe above the valve can leak out, don't you? I understand that to be your position.

A. Yes. My position is that if there was any fluid above the packer it could leak into the pipe, and my position is that if the pressure under the packer is less than the pressure of the fluid that is in the pipe, that the fluid within the pipe can leak down below the packer from within the pipe.

The Court: Leak back down below the packer how?

A. By leaking back through the valve. The valve only stops the fluid from going up and not back down.

The Court: That means that the valve is not tight, doesn't it?

A. Under certain conditions, yes, your Honor.

[fol. 676] The Court: Well, that is the only way the oil above the valve could leak down, of course, would be that the valve couldn't be closed tightly?

A. Yes. The vertical movement of disc D will permit the gas to force D up against c, so that no fluid can enter the pipe. But the vertical movement of D downward will permit the fluid from within the pipe to pass down through the device, because D will move away from c, leaving an opening.

By Mr. Boyken:

Q. Well, let us use that illustration of the picture of his Honor's bench, and consider that to be the tubing of Franklin. The valve, as I understand it, consists of two discs.

I have two half dollars here. And those two discs are interposed in that tubing which forms the valve structure, are they not?

A. Yes.

Q. I mean just for illustrative purposes here

A. Yes.

Q. And it is the rotation of those discs one with respect to the other which opens or closes the valve, depending upon whether or not the passageways match in the turning of the discs; isn't that about the structure of Franklin?

A. Yes, with the addition that the gas pressure——

Q. I am going to that pressure in a moment. That is about the way that operates, to have these two discs inside the tubing, is it not?

A. Yes.

Q. And you rotate those discs one with respect to the other to open and close the valve?

A. Yes.

[fol. 677] Q. You talk about the pressure. You say that if the valve is placed, say, midway in this tubing, you have a pressure from below, do you not?

A. Yes.

Q. The fluid pressure from below?

A. You might have.

Q. Well, in the case of Franklin here, it would be fair to say that if it was an operating device you would have fluid pressure from below?

A. Yes, in that case.

Q. Gas would be fluid pressure, wouldn't it?

A. I would say it would be liquid.

Q. If you have a flowing well, of course there would be liquid that would go up in the top, if the valve was open?

A. Yes.

Q. What causes that pressure to come up to the valve? Isn't that the packer that is surrounding the tubing which builds up the pressure, enabling the pressure to go upwardly to the valve?

A. No.

Q. What is it that does that?

A. It is the rock pressure in the formation that builds up that pressure that forces the oil from the well up through the tubing.

Q. Did you ever hear of a flowing device which did not have a packer around the tubing?

A. Yes. I own a lot of wells that don't have the packer around the tubing.

Q. Those are wells that don't flow through tubing, however, are they?

A. Yes, they flow through the tube.

[fol. 678] Q. How far does that tubing go down?

A. My tubing goes right down to the producing sand.

Q. And the well flows through the tubing and doesn't flow around the outside of the tubing?

A. Yes; it doesn't flow around the outside.

Q. Have you your tubing in the center of the well hole, removed from the side?

A. The tubing is run into the well and packed off at the top of the well by a packing head.

Q. Suppose it was packed off down below, there world be a pressure, would there not?

A. You mean from the formation?

Q. Yes.

A. Yes.

Q. Now, let us go on with our illustration. We have the valve set at the center of this tubing, and you say there is an upward pressure from the formation below which tends to press upward against the lowermost of those two discs. Is that the way I understand your testimony?

A. Yes; and moves the disc D up vertically.

Q. That is, the lowermost of these two discs is moved up vertically from the pressure below?

A. Yes.

Q. Why doesn't that tend to hold these discs together? You say it is the column of liquid that has something to do with it?

A. Yes. So long as the pressure against disc D exceeds the hydrostatic pressure of the fluid within the well it will hold disc D up against c, but when you pull the device out of the well and get it above the fluid or pressure then the [fol. 679] fluid within the tubing can force disc D down and leak out.

Q. Let's not consider that for just a moment. We will come to that later. We have this tubing in the well and you have your upward pressure which tends to hold the two discs together and you have your downward pressure which tends to hold those two discs together. Both of those pressures, if the device remains stationary there, tend to hold

the disc one against the other for a tight valve seat, do they not?

A. No. The pressure from above does not tend to hold the disc D against c.

Q. Then, it is the weight of the pipe that does that?

A. When you are lifting it out of the well——

Q. Let's not go into that. I am assuming a case where it is stationary for the present. You have your upward pressure and your weight of the pipe down. Now, those two forces tend to hold this member together, don't they?

A. Yes.

Q. So that when it remains in the well, at any rate, the valve can be opened or closed without leakage?

A. Yes.

Q. Now, we are drawing out the device. We are pulling it upward from its normal position in the well so that the device arrives at the top of the well hole. In that case you still have your pressure from below going upward against the lowermost of these two discs, is that right?

A. Well, you do——

Q. Have you that pressure?

A. You do when you get near the top of the well. There is a time when a part of the column——

[fol. 680] The Court: Answer the question that he asked.

A. Yes.

By Mr. Boyken:

Q. You have that?

A. Yes.

Q. And, to be fair with you, it diminishes as it goes upward, is that so?

A. Yes.

Q. You still have the weight of the drill pipe down, have you not, against the discs, the top disc, which tends to hold them together?

A. No. The top disc is integral with the drill pipe.

Q. Yes; I know that. But the weight of the drill pipe is still tending to force the top disc down against the bottom disc?

A. No.

Q. Why not? You said it was so, I believe, while it was stationary. Now, what difference does it make when you withdraw it?

A. Well, it would depend on where the device was in the well.

Q. Now, we are withdrawing the device from its position in the well and I want to know why the weight of the drill pipe, which tends to press down on the uppermost of these two discs, does not still continue to force those discs together.

A. The weight of the drill pipe does not press down on those discs as you are lifting it out of the well.

Q. I am talking about the uppermost of these two discs. That is integral with the form of structure above the valve, is it not?

A. Yes. And that upper disc has tension in it because it is lifting the weight of the device and any tubing that [fol. 681] is attached to the lower portion of the device out of the well.

Q. Now, it is the lifting of the pipe, then, that tends to pull the upper disc away from the lower disc in removing the device? Is that the way I understand your answer?

A. Yes. When you suspend the device through the upper disc c, why that is against shoulder b^1; and, unless pressure is holding D up against c, why c would be resting on shoulder b^2.

Q. That is enough of that unless you feel it is necessary for your answer. You say that the pulling up of the drill pipe tends to relieve that pressure of the two discs. I think we are agreed so far. Now, doesn't the weight of the column of liquid that is in that drill pipe above the valve tend to press the two valves together, that is, the two portions of the valve together?

A. No. The weight of the column of fluid within the tubing tends to force C down on shoulder b^2 and separate the two discs.

Q. If we have two discs as I have illustrated them here by these half dollars, and you have a column of fluid above the uppermost of these discs, extending to the top of the well hole, doesn't the weight of that column tend to hold those two half dollars in this illustration together?

A: No, because your upper disc has a hole in it and it lets the pressure through that half circle be exerted on lower disc D.

The Court: All right. That is enough.

By Mr. Boyken:

Q. As I understand you, this half dollar, which I am using for illustration, has a hole in it. Now, I am not talking about the pressure that is exerted through this uppermost [fol. 682] most half dollar and through the hole. I am talking about the weight of the fluid that is bearing on the portion of the valve which has no hole in it. What about that?

A. That would not exert a downward pressure on D because the hydrostatic pressure is in all directions. And since there would be a space between D and c, it would also exert an upward pressure on c.

Q. I am not talking about the upward pressure now. I am talking about the downward pressure, that is, the weight of this column of fluid. The weight of that column of fluid would tend to hold these two discs together except in that small area, which is probably a third or a fourth of the size of the disc, where there is a hole?

A. No.

Q. You don't agree with that?

A. No.

The Court: Are you and the witness agreed that there is play up and down between the two portions of the valve? In other words, the witness contends that the lower portion of the valve is movable up and down. That is your contention, isn't it?

A. Yes, sir.

The Court: Now, do you agree that that is movable up and down?

Mr. Boyken: Yes, your Honor; in one form. In the form that is shown in the drawing of the patent there is a slight up and down motion.

Q. So far we have been talking about the movement of these two discs in respect to each other, that is, this slight play. You are aware are you not, that there is a different [fol. 683] construction which is mentioned in the patent, that is, page 2, line 32, where it says, "The disc D may be attached solid to the part B"? I am going to stop there. The disc D is the lower disc in our illustration. Now, if that is attached solid to the part B, which is the illustration

here is the pipe corresponding to this, there would be no play, would there?

A. Yes; there would be a play of the disc C between D, which is solid with B, and the flange at b[1].

Q. In other words, if we got away from this slightly floating disc and made the device as in the Simmons patent, for instance, where there is no floating disc, but each disc member is integral with the portion of the structure, then in that case there would not be any of this separation of discs as I understand this disclosure?

A. Yes. Assuming that you made it like the Simmons patent, there would not be.

Q. Now, taking the alternative structure to which I have called your attention, in such a case, in order to have a valve structure, there would be no separation between those valve members?

A. Yes, there would be a separation, because at line 13 on page 2 it says: "Between the shoulder B^2 and the flange B^1 there is enough room to leave a very little play vertically to the parts lying between." So the part C is lying between the shoulder B^2 and the flange B^1 and could move vertically.

Q. Do you think that if you take this form which I have called your attention to, described commencing at line 32, [fol. 684] page 2, and it intended to have a valve, do you think there would be any leakage in such a valve?

A. Do you mean and make it in accordance with the teachings of the Franklin patent?

Q. No. I am asking you to confine yourself now to that structure which I have just called your attention to, namely, the disc D may be attached solid to the part B. Now, when you attach it solid and you want a valve structure, would there be any leakage?

A. It would depend on how you constructed the rest of the valve.

Q. You could construct it so there would be no leakage, could you not?

A. Yes.

Q. I asked you last evening before adjournment if any different problem was presented if a testing tool was lowered through oil, for example, as against lowering a testing tool through rotary mud.

"The Court: You are referring to this Franklin patent, are you?

Mr. Boyken: Well, I will be willing to confine the question to the Franklin patent. Let me reframe it.

The Court: The question is clear, I think.

Mr. Boyken: I thought so.

Mr. L. S. Lyon: I don't understand what you mean by a different problem.

The Court: Whether ~~any~~ different problem is presented, greater difficulty, I suppose, in lowering through oil, than that encountered in lowering through fluid.

Mr. L. S. Lyon: Is that what it means, is it harder to put one down through oil than it is through mud?

[fol. 685] The Court: I suppose, or easier."

A. I think I understand it, if you mean just the lowering of a device in the well. I don't think that the problem would be any different. You would use the same machinery and everything.

Q. Now, if you drill by the rotary method it is always necessary that drilling fluid be present in order to complete your drilling operation; is that so?

A. Yes.

Q. And in drilling by the rotary method do you always use this so-called rotary mud that was described here?

A. Well, you use a drilling fluid. Sometimes it may be that you are drilling through a formation that naturally makes a mud of the proper consistency. If it doesn't, then you admix to it to make it a mud fluid.

Q. What do you mean by "natural mates" in connection with the drilling of an oil well?

A. What did I mean?

Q. You used the expression "natural mates," and I want to know what you mean by that.

A. Natural mix.

Q. I understood you to say "natural mates," but if you said "natural mix" that will be all right for me. What expression did you use in your last answer?

A. I said that the formations encountered in drilling in some localities, that is, I meant to say that, are of such a nature that it makes a mud fluid of the proper consistency without adding admixtures such as weighting material and baroid as a suspensoid.

Q. In other words, under those conditions there is no necessity of injecting this so-called rotary mud that has [fol. 686] been described here? Is that the way I should understand your answer?

A. I don't understand your question.

Q. Let me reframe it. I take it from your last answer—and if I am not correct I wish you would correct me—that there are occasions where the drilling fluid is naturally in the well and there is no necessity of injecting any outside drilling fluid in order to assist your drilling operation?

A. Yes.

Q. Do you at times use oil as your drilling fluid, in drilling a well by the rotary method?

A. Well, I never have used oil. Sometimes after the casing has been set and they are drilling in the oil sand, then they will remove the mud fluid and use oil to circulate, instead of mud, in order to keep from getting the pressure of the mud fluid on the sand. But I only know of one or two localities where they do that, and that is where the oil is contained in a very porous formation, with fissures, and the weight of the mud fluid drives the oil away, and they use oil instead of mud fluid and drill in under pressure, packing off the drill pipe at the top of the well.

Q. In those one or two cases which you speak of, then, oil is used as the drilling fluid, under the circumstances just related by you?

A. Yes.

Q. Now, what is the reason for the use of drilling fluid when a well is drilled by the rotary method?

A. Well, the drilling fluid performs several functions. First, it is an agent that removes from the well the cuttings as fast as the bit cuts the hole. It also produces a hydro-[fol. 687] static pressure that confines any cognate fluid in any formation encountered in its respective formation; and it also plasters by building up a sheath on the formation, and its hydrostatic pressure exerted on the walls of the formation keeps the formation from caving in. So it is really very necessary and very important.

Q. You have heard the testimony here, Mr. Halliburton, with regard to the use of the so-called full-sized Franklin device in the oil fields of California, recently?

A. Yes.

Q. Do you consider that such use is an infringement of the Simmons patent here in suit?

Mr. L. S. Lyon: I object to that, your Honor, on the ground that that is asking the witness for a legal opinion, and, further, that he doesn't necessarily accept the testimony that has been offered here. He was asked yesterday if he understood how this thing was set up, whether it was set up so that it operated in the way the Franklin patent discloses, without play or not, and he said he didn't know.

Mr. Boyken: I want to find out, your Honor, to what breadth this witness expects to extend the Simmons patent.

The Court: Well, I think it is asking him for a legal opinion. I don't think you can do that. If counsel were on the witness stand you might properly ask it. Objection sustained.

Mr. Boyken: I would like to take the answer to that, as Mr. Lyon has taken it, taken the answers to other questions, if your Honor will permit it.

Mr. L. S. Lyon: The witness may not have an answer, your Honor.

[fol. 688] The Court: Well, we will find out. You can answer the question for the purposes of the record.

A. If the Franklin device is so modified by the addition of a packer and used in accordance with the teachings of the Simmons patent, I would say that it was an infringement.

By Mr. Boyken:

Q. Now, let us take up the Edwards patent. That is Edwards patent No. 1,514,585. That is the second patent you discussed yesterday on your direct examination. I understand that is a two-string tester; is that right?

A. Yes.

Q. What is the purpose of the outer string which is designated by the number 1 in Figure 1 of the patent drawing?

A. It is one of the elements of the Edwards device, so that he can provide for circulation.

Q. So that he could establish circulation or maintain circulation; is that right?

A. Yes, while he is taking a test.

Q. According to the patent, why does Edwards want to maintain circulation?

A. He wanted to maintain circulation, he says in the patent, so that the tester wouldn't stick and also to provide for rotating the outer pipe 1.

Q. That is to say, rotation in rotary mud, if it be that kind of drilling fluid used?

A. Well, he provides for a circulation of the drilling fluid down between pipe 1 and pipe 8, and he would be circulating at the same time he was taking a test, by pumping up outside.

[fol. 689] Q. In other words, while the test was being taken rotary mud could be circulated in the hole above the packer; isn't that what the patent says?

A. Yes.

Q. All right. Now, this Edwards device is adapted for making a test by lowering the test tube through rotary mud in the drilling of an oil well?

A. Yes.

Q. And, as I understand this patent—and correct me if I am wrong—the testing device of Edwards is lowered down through rotary drilling fluid to the point where the test is to be made; is that the way it is described here in the patent?

A. Well, yes, just above the point.

Q. Just above the point. Then the packer is set; is that the next step?

A. No. The packer is run into the well before the test tube is put in the well.

Q. The packer comes in first with the pipe 1, and then the tester is inserted later?

A. Well, the test tube, yes.

Q. Then what, if anything, has the pipe 1 to do with the tester?

A. The pipe 1 carries the member designated as 4, so that there is a seat for sleeve 7.

Q. Does the pipe 1 perform any function in the testing operation other than providing the seat to which you have just called attention?

A. Yes; it carries the packer.

Q. It carries the packer?

A. Yes.

[fol. 690] Q. Do I understand from your direct testimony that you consider a two-string device of this kind to be impractical?

A. Yes.

Q. In your application for patent, the file wrapper of which is in evidence here, and which application was abandoned, didn't you show a two-string device yourself?

A. I don't remember. We may have provided an inner pipe just above the valve to extend part way up, so that fluid could be put between that pipe and the test string to partly overcome the hydrostatic pressure on the outside of the pipe, but not for any purpose shown in any of the patents in the prior art. I don't remember whether that application contains that or not.

Q. Irrespective of your reasons, it was a two-string device that was shown in your abandoned application, was it not?

A. No.

Q. It was not a two-string device?

A. No.

Q. Will you look at that drawing? Now, in the drawing that is attached to that patent, I call your attention to the figure at the left-hand side, and point to the protrusion of what appears to be the second or inner string of pipe which extends downwardly to the bottom of the well hole, and then also to the figure immediately to the right of that, which shows that inner string of pipe coming partially upward. Isn't that one string of pipe within another?

A. It never was intended that the inner string of pipe should extend to the top of the well.

[fol. 691] Q. I didn't ask you that. I am asking you if that isn't a two-string device, in so far as it is extended.

A. Yes, it would have two strings so far as it is extended.

Q. According to your drawing, it extends a considerable distance from the bottom of the well hole, does it not? Just take another look at that drawing.

A. Well, of course the pipe is cut away, and this is not drawn to scale, but it was only intended——

The Court: Just answer that question. The record is filled up with matter that is not responsive to the questions.

A. No.

By Mr. Boyken:

Q. Doesn't this drawing and the figure to which I have called your attention show the inner string of pipe extending all the way up to the very top of the outer tube, as shown in the left figure of that drawing?

A. No, it doesn't show it all the way from the bottom to the top.

Q. You mean on account of the break that is between?

A. It doesn't show that it passes through the break.

Q. But it does show at the top, does it not? I wish you would bring that over here so his Honor can see what I am referring to. We are talking about two-string devices. I am now calling your attention to the figure at the left of the drawing attached to Defendants' Exhibit A, and ask you if that does not show one pipe within another, and I am pointing now to the top of that figure which shows one pipe within the other, and also to the figure immediately to the right of that, which shows one pipe within the other [fol. 692] extending up a portion of the entire distance of that figure. Do you see that?

A. Yes. I don't understand that it shows that pipe at the top.

Q. Well, let us take it gradually. You see the second figure on the left-hand side there, which does appear to have one pipe within the other. Do you agree with me so far?

"A. Yes.

Q. The pipe I have just called your attention to, which seems to be marked by the number 41, is also in the left figure and extends downwardly to the tool, as shown at the top of the left figure, where the inner pipe extends beyond and above the outer pipe? Do you agree with me so far?"

A. I don't know whether that is intended to show that or not.

Q. It is your patent application, is it not?

A. Yes.

Q. And you know, don't you, Mr. Halliburton, that there were two strings, one within the other, extending a portion of the way up to the top of the well?

A. Yes.

Q. All right. Now, this break which appears in the left figure, that may be one foot or a thousand feet in there, may 't not, according to this drawing which is in your patent application?

A. Yes.

Q. In so far as one pipe is within the other, whether it be 5 feet or several thousand feet, there are two strings, are there not, there?

A. Yes, as far as it extends up into the two strings.

[fol. 693] Q. According to the showing of these two figures in the patent it would appear to extend up about three-quarters of the way?

A. I would have to read the specification. In this patent application I provided an inner pipe that would go just above the testing tool, so that I could put enough fluid, say a thousand feet in a seven or eight thousand-foot well, between the two pipes to overcome the hydrostatic pressure on the lower end of the drill pipe, and at the same time have a sample pass through this thousand feet of inner pipe and above that, so that I could get a sample and provide a safety factor for the collapsing of the drill pipe.

The Court: There is casing in that drawing?

Mr. L. S. Lyon: This figure over here does not show any either from here to here, this pipe 41, but somebody somewhere put a little thing up here at the top, and the question Mr. Boyken is after is whether this pipe here, this pipe 41, which doesn't appear in here at all, actually was intended to run clear to the top of the well, because here it is sticking out here.

The Court: How could he get the fluid into it?

Mr. L. S. Lyon: How would you get that mud fluid in there?

A. That is connected onto the top of the testing apparatus so that when the valve is opened it passes up through that inner tube for a thousand feet, we will, say, in a deep well, and then right into the drill pipe, and it wasn't intended that the inner tube extends up any further than was necessary to hold the fluid in the device high enough to counteract a part of the hydrostatic pressure against the pipe.

[fol. 694] Mr. L. S. Lyon: Now, you might make that simpler. That was just down to this part to prevent the collapsing of the pipe?

A. Yes.

By Mr. Boyken:

Q. And that might be a matter of a thousand feet or so?

A. Well, I think the file wrapper will show how far it was intended to come up.

Q. Now, some question has been raised with respect to whether or not an inner pipe is shown in the left figure.

This is the outside of the pipe as it is supposed to be shown here, is it not?

A. Yes.

Q. There is no question in your mind, is there, that there is an inner string of pipe that goes downwardly to the tube itself in the left figure of that drawing?

A. Well, the drawing is not a dimension drawing and I don't know how long it is. It would appear to be at the top if there was something to show that there was a pipe.

Mr. L. S. Lyon: Do you say this is the top?

Mr. Boyken: This is the bottom and this is one section and this is the other section and this is the top. You go from the bottom up to this point and then take the next figure and go up to that point.

Mr. L. S. Lyon: Then, you don't contend this pipe goes to the top of the well?

Mr. Boyken: No. But I do contend it goes all the way in from that first figure, which may be a thousand feet or more.

A. It shows it to be three joints.

[fol. 695] By Mr. Boyken:

Q. At any rate that inner pipe extends upwardly from the tube?

A. Yes.

Q. And upwardly as far as necessary?

A. Yes.

Q. I want to ask you, Mr. Halliburton, how does Edwards, as set forth in his patent, effect the final seal-off of the drilling fluid before he makes a test?

A. By seating sleeve 7 in a part marked 4 and by having the perforated part screwed up into the sleeve 7.

Q. Let's take up the next patent you considered on your direct examination, which was the Cox patent, No. 1,347,534. That is a device shown there for the testing of oil wells, is it not?

A. Yes.

Q. And it particularly mentions wells drilled by the rotary system, does it not? I call your attention now to page 1, lines 10 and 11.

A. Yes.

Q. So he contemplates making a test in a well drilled by a rotary system, is that so?

A. Yes.

Q. And he intends to make the test while the well is filled with rotary mud, does he not?

A. Yes.

Q. And the test tube or the testing device is lowered down through that mud?

A. Yes.

Q. And the object, as set forth on page 1, lines 9 to 29, is to obtain a sampling test of the oil that may come from the formation?

A. Yes.

[fol. 696] Q. Just how is the object which is sought to be attained by the Cox patent any different from the object sought to be attained by the Simmons patent here in suit?

A. Well, there is quite a bit of difference. Cox provides for a circulation and two tubes. He provides that the plunger 7 break a disc 13a.

Q. Just a moment. You are describing the structure. I am asking you the object sought to be attained, which doesn't call for any structure. I want to know if what Cox wanted to do is any different from what Simmons wanted to do. And you can confine yourself to both patents in answering that question.

A. Yes; Cox wanted to get or secure a sample.

Q. I am asking you if the object which Cox sought to attain is the same object as Simmons sought to attain. And in answering that question you can confine yourself to what both patents say.

A. They both sought to obtain a sample.

Mr. Boyken: I want to get a yes or no answer if I can.

The Court: Yes. Answer it yes or no, Mr. Halliburton. Answer that by yes or no.

Mr. L. S. Lyon: No.

Mr. Boyken: I don't think counsel ought to prompt the witness.

The Court: Don't interrupt now. The witness is directed to answer by yes or no. He declines to do so. Ask another question. Let the record note that and we will go on with something else.

Mr. L. S. Lyon: He hasn't declined, your Honor. He is trying to consider what to say.

[fol. 697] The Court: He is directed to answer again.

Mr. L. S. Lyon: All right. If you will give him sufficient time, he will answer.

The Court: Let the record stand as it is now. Proceed.

By Mr. Boyken:

Q. I am going to read to you from page 1 of the Cox patent, commencing with line 9, and ask you to carefully note this because I am going to ask you if the object as set forth in the portion I read is not the same object that Mr. Simmons seeks to attain by his patent. "This invention relates to improvements in well drilling, particularly to wells drilled by the rotary system, and in such connection it relates more particularly to a device for testing wells in order to ascertain if oil, water, gas and other liquids are under the path of the drill or in proximity thereto, that is, the stratum which has not been disturbed or only partially disturbed by the drill bit; to provide means for procuring and bringing to the surface a small quantity or sampling test of such oil, sand, water, or whatever is in the path of the drill bit, for inspection and analysis; and also to provide an efficient and satisfactory means for complete separation of the water, mud, slush, et cetera, in the hole above the point from which the test is to be taken from the quantity to be investigated and analyzed, to thereby arrive at an accurate determination of the value of the drilled hole." Now, I am asking you if that portion that I read to you in the Cox patent does not state the same object as is sought to be obtained by the disclosure of the Simmons patent here in suit.

A. No. That states a part of the sand and it is not intended in the Simmons invention to bring out any of the sand.

[fol. 698] Q. If you substitute "oil" there, which appears in the portion that I read, then it is the same, is it?

A. Yes; with that assumption.

Q. In other words, if the Cox patent desires as an object to sample the oil as distinguished from the sand, then the object is the same as that sought to be obtained in the Simmons patent? Is that your answer?

A. Yes. He wanted to get a sample.

Q. No. I didn't ask you that. With the exception of the substitution of "sand" for "oil" are the objects the same? Do you understand that question?

The Court: I understand him to have answered that in the affirmative, that it is the same except that the Cox patent might call for oil.

By Mr. Boyken:

Q. I call your attention to the title of this patent, Mr. Halliburton, where it says "Device for testing wells for oil, gas, &c." Have you taken that into consideration?

A. Yes.

Q. Isn't the sand that you speak of in suspension in some liquid?

A. No; I don't think that Cox intended that it be in suspension. I think that he intended to get a part of the bottom of the well.

Q. Do you think that would be dry at the bottom of the well? Wouldn't it be in some kind of liquid, oil or something else;

A. Yes. It would be saturated with oil.

Q. Saturated with oil?

A. Yes; and water if water was in the formation.

Q. As I understood your direct examination, you said that in the use of this Cox device when you picked up on [fol. 699] the drill string you would obtain drilling fluid in the sampling chamber as well as the sample itself, is that correct?

A. Yes; when you release the packer.

Q. In other words, the sample from the formation would first go upwardly in the test tube or test string designated by the number 15 in Figure 2, and afterwards the drilling fluid would go up there, following the formation which was tested?

A. Yes.

Q. So that there would be the two, that is to say, the fluid from the formation and the drilling fluid, in the same test string?

A. Yes.

Q. Doesn't that always occur in testing where you have drilling fluid and formation fluid in the same chamber?

A. No; not from above the point where the packer was seated.

Q. Just what do you mean by that?

A. I mean that the present testing devices, such as the Simmons and Johnston devices, do not permit the fluid that

is above the formation or above the packer and on the outside of the pipe to enter the test string.

Q. But in the case of the Cox device, as disclosed in this patent, it is the drilling fluid from the formation below the packer which first ascends in the testing string 15, or I think that is 13? I am not sure whether the drawing shows 13 [fol. 700] or 15, but you see the drilling string that I mean.

A. No. The drilling fluid up above and surrounding the pipe rushes down around the packer and into the test string. That doesn't happen in the Simmons device.

Q. According to the disclosure of the Cox patent it is intended that that packer should operate to seal off the formation above from below the packer, is it not?

A. Yes.

Q. Suppose that packer seals off that formation and then the valve is open so that the fluid from below the packer goes upwardly in the test tube, I understood you to say that in that event the drilling fluid followed that upwardly by the release of the packer?

Mr. L. S. Lyon: Is there a question, your Honor?

By Mr. Boyken:

Q. Is my statement correct or do you differ with me?

A. Yes; the drilling fluid would follow.

Q. The fact that the fluid to be tested and the drilling mud are in the same chamber, in this case in the tube designated apparently by 15, is that detrimental to the test?

A. Well, you wouldn't know whether you had a test or not perhaps.

Q. Then, is your answer yes or no?

A. I would say it is detrimental.

Q. In every test that is made, take, for instance, the Simmons tool with the "rat-hole" packer, don't you in the same chamber have the drilling fluid and the rotary mud which comes out of the "rat-hole"?

A. Yes; we have the rotary mud that comes out of the "rat-hole" but we know how much that is.

[fol. 701] Q. You know how much that is?

A. Approximately; yes.

Q. Can't you segregate the rotary mud from the formation fluid?

A. Yes.

Q. You can identify the rotary mud from the sample, can you not, if the two are in any kind of a chamber?

A. Well, if the sample didn't have to be rotary mud, you could; yes.

Q. If it was anything but rotary mud, you could identify the two, and, if it was rotary mud, it would be all the same, would it, that is to say, that the fluid in the chamber would be all of one kind rather than separate?

A. Yes.

Q. Does the sample which is entrapped in this Cox device come from below the packer?

A. Yes.

Q. And, if there is such a sample entrapped, does it come from the formation which is below the packer?

A. Yes.

Q. I notice that in both the Cox patent and the Edwards patent there are two-string devices, whereas, on the other hand, the Simmons patent has a one-string device. The object of the two-string device, as I understand, is to establish this circulation and keep the circulation?

A. Yes.

Q. In the case of your new "J" tool you also make a provision for re-establishing circulation, do you not?

A. No; not while we are taking a test.

[fol. 702] Q. But after the test is being taken you may establish circulation according to the "J" tool?

A. Yes. But that would destroy the test.

Q. But, whether or not it destroys the test, you can establish the circulation?

A. Yes. We provide a circulating valve and also provide a circulating valve with the stop cock and gear device.

Q. Do you consider it an improvement to eliminate the circulation which is shown in the Cox and the Edwards patents while making your test?

A. Yes.

Q. Then, under those circumstances, if you consider it an improvement, why did you in your "J" tool provide means for establishing the circulation?

A. That was for an entirely different reason. Cox and Edwards provided a circulation to keep the pipe from sticking. We provide circulation to keep the well from blowing out.

Q. But in either event it is circulation, is it not?

A. Yes. But only in an emergency do we circulate with the Simmons device.

Q. I am quoting from claim 9. "Apparatus for testing a well." You find apparatus for testing a well in the Cox patent and in the Edwards patent?

A. Yes.

Q. Continuing, "comprising a string of pipe to be lowered into a well." Do you find a string of pipe adapted to be lowered into a well in Cox and in Edwards?

A. Yes; a string of pipe to be lowered into a well; in fact two strings.

Q. There are two strings, any one of which may be a string?

A. Yes.

[fol. 703] Q. In the Franklin patent also, eliminating the testing element, do you find a string of pipe to be lowered into a well?

A. Yes.

Q. Continuing, "having an inlet at its lower end." Now, you find, do you not, in Cox, Edwards and Franklin an inlet at the lower end?

A. Well, in Cox and Edwards there are two inlets and in Franklin just one inlet; not just an inlet but two inlets.

Q. Any one of those may be an inlet, may it not?

Mr. L. S. Lyon: That is argumentative.

Mr. Boyken: All right. I will withdraw that question.

Q. "and carrying a packer." You find, do you not, in Cox and Edwards that the device carries a packer?

Mr. L. S. Lyon: That is not what the claim says. Are you asking him what the claim says or some other question?

The Court: Let the witness answer.

A. Yes; Cox and Edwards carry packers.

By Mr. Boyken:

Q. Continuing, "a packer adapted to be positively pressed against the walls of the formation." Does the packer in Cox and Edwards press positively against the walls of the formation? Doesn't the packer in Cox and Edwards press positively against the walls of the formation?

A. Yes.

Q. Continuing, "to seal off the same above the inlet." Doesn't the packer in Cox and Edwards seal off above the inlet?

A. Well, yes.

[fol. 704] Q. Continuing, "and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated." In the case of Franklin do you not find a valve for the inlet positively controlled by the movement of the pipe to open and close the inlet?

A. Yes.

Q. While the packer is seated?

Mr. L. S. Lyon: In what case?

By Mr. Boyken:

Q. In which one of those three patents does that occur?

The Court: Mr. Lyon, don't interrupt counsel. If you have an objection, you may state it.

Mr. L. S. Lyon: I object to that on the ground that the witness has not been asked or given an opportunity to state whether there is any packer on this pipe in the Franklin device.

The Court: My recollection is that he has already answered the question in the affirmative.

Mr. L. S. Lyon: Not in regard to Franklin. That was kept out of the question, your Honor.

The Court: Read the question, Mr. Reporter.

(Question read by the reporter.)

Mr. L. S. Lyon: If your Honor please, my objection is this——

Mr. Boyken: I am going to reframe the question to eliminate this argument.

The Court: Wasn't the element of while the packer was seated in the first question?

Mr. L. S. Lyon: No.

Mr. Boyken: It was in the first portion of the question; yes.

The Court: And he answered it yes, didn't he?

Mr. L. S. Lyon: No, your Honor.

[fol. 705] The Court: Well, never mind. We won't take up the time with it. Proceed with your questions.

Q. Referring to this last portion that I just read from claim 9, which concludes the claim, that element in itself, do you not find that in Cox and in Edwards?

Mr. L. S. Lyon: What element is that? I object to that.
Mr. Boyken: I just read it.
The Court: Well, repeat it.
Mr. Boyken: All right. I will repeat it now.

Q. At the end of claim 9 it says, "and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated."
A. No: I don't find that in Cox or Edwards.
Q. Why don't you find that in Cox or Edwards?
A. Cox does *does* not show a valve that can be opened or closed by a movement of the pipe.
Q. What about Edwards?
A. And Edwards does not show a valve that can be opened and closed by a movement of the pipe. Edwards can be opened by movement of the pipe if you call the sleeve 7 and the tube 8 a valve. Then it can be opened but it can't be closed by movement of the pipe.
Q. If you consider in Edwards the tube 8 as the pipe, doesn't the upward movement of that pipe close the inlet to the pipe?
A. No: I wouldn't say that that would close it.
Q. You don't think so?
A. No.
Q. What does Edwards say about that?

Mr. L. S. Lyon: Do you mean in the patent?
[fol. 706] Mr. Boyken: In the patent.

A. Edwards doesn't say anything about closing it. He says you pump the oil out if it will not flow out.
Q. Look at page 1, commencing with line 105 and down to line 110, where it says, in line 108, "and the test stem is then withdrawn before withdrawing the drill pipe and packer." The upward movement of that inner tube there so that the perforated openings are within that sleeve will close that valve member, will it not?
A. No. He provides a packing at 9 above, which would keep it from leaking down between the sleeve 7 and the tube 8, but he doesn't provide any such packing at the bottom of sleeve 7 to keep it from leaking up through the sleeve 7 and into the perforations.

Q. Then, what about Franklin? Don't you think that Franklin shows a valve for the inlet positively controlled by movement of the pipe to open and close the inlet?

A. Yes; he shows a valve.

Q. And that valve that Franklin has is positively controlled by the rotary movement of the pipe?

A. No. That, in combination with the pressure of gas against the plate D, closes it and seats it.

Q. That closes the valve?

A. Yes.

Q. Very well. I want to do the same thing with this method claim and then I will be concluded. I am going to take the method claim No. 8, for example, of this Simmons patent. It says, "A method of testing the productivity of a formation encountered in a well containing drilling fluid." Don't Cox and Edwards show a method of testing the productivity of a formation encountered in well-drilling?

A. Yes,

[fol. 707] Q. That is, encountered in a well containing drilling fluid?

A. Yes.

Q. All right. Continuing; "which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation." That is true, again, of Cox and Edwards, is it not?

A. Yes. They both lower an empty string of pipe but they also lower another string——

Q. You have answered my question. It is also true of Franklin, is it not, that an empty string of pipe is lowered into the well through the drilling fluid adjacent the formation?

A. Well, an empty string. But he does not state that he lowers a valve adjacent any formation.

Q. But he does say it may be put deep in the well, does he not?

A. Yes.

Q. Continuing, "the pipe carrying a packer." I am going to pause there. In Cox and Edwards there is a packer shown, is there not?

A. Yes; there is a packer.

Q. All right. "and having a valved inlet at its lower end which is closed while the pipe is being lowered."

A. No. In the case of Edwards the valved inlet is not closed while the packer is being lowered.

Q. Let's take Franklin now. Is there a valved inlet which is closed while the pipe is being lowered?

A. Yes.

Q. "setting the packer above the formation to seal off the drilling fluid from the formation." That is done in Cox and Edwards, isn't it?

A. Yes. Cox and Edwards set a packer to seal off.

[fol. 708] Q. "opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe." In the case of Edwards, when that valve is open, whatever fluid is below enters the valved inlet, does it not?

A. Yes; it enters a valved inlet if you want to call that sleeve a valve. But that sleeve can't be closed and I wouldn't term it a valve.

Q. You wouldn't call the device shown in the Franklin patent, those two discs, a valve?

Mr. L. S. Lyon: You were asking about Edwards.

By Mr. Boyken:

Q. I beg your pardon. Let's confine ourselves to Edwards.

A. No. Edwards doesn't call that a valve.

The Court: Are you referring to 7?

A. Yes, your Honor.

By Mr. Boyken:

Q. Do you say that Edwards does not call that member 7 a valve?

A. No.

Q. What about Cox?

A. Cox shows a check valve 15 that will permit fluid to flow up through it.

Q. And in the case of Franklin there is also a valve shown, is there?

A. Yes.

Q. Continuing with that claim, "closing the valved inlet against the entrance of fluid from the well by movement of the pipe." Do you find that in Franklin, that is, that the valve is closed by the movement of the pipe?

A. Yes; in co-operation with the pressure of gas to seat the valve disc D up against C.

Q. Do you also find that element in Edwards?

A. No.

[fol. 709] Q. Doesn't the upward movement of the pipe, if we call it the pipe 8, close the valved inlet against the entrance of fluid from the well?

A. No.

Q. You don't think so?

A. No.

Q. The last element of that claim is, "raising the pipe so closed to remove an entrapped sample and the packer from the well." In the case of Cox is not the pipe raised to remove an entrapped sample and the packer from the well?

Mr. L. S. Lyon: I object to that as not definite, your Honor. The claim says "the pipe so closed." Now, what does this question refer to? Is it any pipe or the pipe that has been closed?

The Court: Let the witness answer.

A. Yes. But the valve is not closed.

By Mr. Boyken:

Q. If there was a sample entrapped in the use of the Franklin device, when the pipe on the Franklin device is raised with the valve closed that entrapped sample would be brought to the top of the well, would it not?

A. No. I think the pressure of the sample on the inside would force disc D down and would pass out and into the upper part of the well.

Q. You are assuming a leaky valve but I am assuming now for the purposes of my question the valve closed so it would not leak. Then would it respond to that element?

A. Yes; making the assumption it wouldn't leak.

Q. You have answered my question. Thank you. That is all.

[fol. 710] Redirect examination.

By Mr. L. S. Lyon:

Q. Mr. Halliburton, referring now to claim 9, in interrogating you regarding whether or not the elements of this claim apply to the prior art counsel avoided asking you whether there is any packer on the pipe that is lowered into the well with the valve in the Franklin device. Is there any?

A. No.

Q. Will you point out in the Franklin patent each statement referring to the lowering or the raising of the valve in the Franklin patent into the well, and show to the court whether or not any packer is included on the equipment that is lowered into or removed from the well with the valve?

A. The Franklin patent doesn't state that the packer is lowered into the well with the valve. It would seem from reading the patent that the packer is already in the well.

Q. Is that true of each case throughout the patent where reference is made to the lowering of the valve into the well or the raising of the valve out of the well?

A. Yes.

Q. In each case the statement is that the device is lowered with the tubing or raised with the tubing, is that correct?

A. Yes. And it doesn't state anywhere that the packer is on the tubing.

Q. As one skilled in the art, if you were given the directions of the Franklin patent to follow, and particularly were told to lower this or install this Franklin valve within the well but preferably at a point above the packer, as stated [fol. 711] at line 17 of page 1, where would you consider the packer to be?

A. Well, I would ask where the packer was. I would consider it on the casing.

Q. And you would ask at what level it was?

A. Yes.

Q. It is clear to you, is it, that the packer is not on the tubing with the valve to be lowered in the well but is already in the well, is that correct?

Mr. Boyken: I object to that unless the patent says so. I was confined to the patent.

Mr. L. S. Lyon: I asked him if it was clear to him from the patent.

The Court: I think that question is objectionable on the ground it is leading. But I am considerably at sea with respect to this packer in the Franklin patent. It merely mentions a packer. There is no statement as to what it is really for.

Mr. L. S. Lyon: None whatever.

The Court: Nor where it is to be placed except above or below the valve.

Mr. L. S. Lyon: That the valve in the well is to be above the packer.

The Court: I think we have discussed this Franklin patent at considerable length both last night and this morning and, unless there is something you want to specifically call attention to, and you may do that from where you stand, we will pass to something else.

Mr. L. S. Lyon: I was only interrogating the witness because I formed the opinion that your Honor thought he had admitted in answer to Mr. Boyken's questions that there was a packer on this tube in the Franklin device. Mr. [fol. 712] Boyken carefully avoided asking him that and I just wanted to clear that up in your Honor's mind.

The Court: Yes.

By Mr. L. S. Lyon:

Q. And also, of course, there is no statement, or is there a statement, in the Franklin patent corresponding to the statement in claim ~~8 of the patent~~ in suit, in the last line; "raising the pipe so closed to remove an entrapped sample and the packer from the well"?

A. No; there is no such statement.

Q. Is there any statement or any disclosure in the Franklin patent at all of pulling out the packer when you pull out the tube with the valve on it?

A. No.

Q. What does the patent say in each case as to what comes out when you pull out that tube?

A. The patent states that the valve is closed so there will be no flow up through the tube; in other words, that you won't bring out anything in it. Any flowing oil that came in would flow on out. And, if you closed the valve by turning the device, gas would keep the disc D seated so nothing could get in.

Q. You pointed out in connection with your patent application for the stop cock and gear device a provision in there for an extra pipe 41 and explained what that was for. Was that an essential part of that device?

A. No.

Q. Where such an extra pipe was to be used was it intended to go to the top of the well?

Mr. Boyken: We object to that——

A. No. We never have used that.

Mr. Boyken: Just a moment. I object to it on the ground it is leading.

[fol. 713] The Court: Yes; it is objectionable on that ground.

Mr. L. S. Lyon: He answered no and I don't know how it could be leading.

The Court: He is your witness. He has already testified about this.

By Mr. L. S. Lyon:

Q. In the actual five thousand or more tests that have been made with this stop cock and gear device has that extra pipe 41 ever been used?

A. No.

Mr. L. S. Lyon: I think that is all, your Honor.

The Court: All right.

Mr. L. S. Lyon: I have one question here. Perhaps we can call Mr. Simmons on it. There is one point. At page 955 of the transcript of Mr. Simmons' testimony, where he was testifying about how much money he received for his patent, he was asked if the $5,000 was in addition to the $2500 he received, and the answer at line 9 is "Yes, sir," and Mr. Simmons would like to have that corrected to "No, sir." It makes no difference in this case, but he wants it to be correct.

The Court: Very well.

Mr. Boyken: We will stipulate to that, your Honor.

Mr. L. S. Lyon: The plaintiff rests, your Honor.

The Court: Do both parties rest?

Mr. Boyken: Yes, both parties rest.

[fol. 714] In United States District Court

Stipulation as to Narrative Statement of Evidence

It is Hereby Stipulated and Agreed, by and between the parties hereto, through their respective attorneys, that the foregoing document consisting of pages 1 to 578 inclusive is hereby agreed upon as the narrative statement of testimony to be incorporated in the transcript of record on appeal in the above entitled cause.

Dated this 3rd day of March, 1937.

Lyon & Lyon, Leonard S. Lyon, Henry S. Richmond, Attorneys for Plaintiffs-Appellants. Hill, Morgan & Bledsoe, by Kenneth Wright, A. W. Boyken, Attorneys for Defendants-Appellees.

[fol. 715] IN UNITED STATES DISTRICT COURT

ORDER APPROVING NARRATIVE STATEMENT OF EVIDENCE

The foregoing condensed statement of evidence, together with the exhibits referred to and incorporated in the book of exhibits and set forth therein as a part hereof is Hereby Allowed and Approved and the same is Ordered Filed as the condensed statement of evidence to be included in the record on appeal in the above entitled cause as provided for in Equity Rule 75.

Those portions of the condensed statement, exclusive of the testimony of expert witnesses, which is set forth therein in question and answer form, has been requested by the respective parties, and it is Ordered that the same be so printed in question and answer form.

Dated this 4th day of March, 1937.

Geo. Gosgrave, U. S. District Judge.

[Endorsed]: Due service and receipt of a copy of the within "Narrative Statement of testimony" acknowledged this 3rd day of February, 1937. W. A. Boyken, Hill Morgan & Bledsoe attorneys for defendants. Lodged Feb. 3, 1937. R. S. Zimmerman, Clerk, by Edmund L. Smith, Deputy Clerk.

[File endorsement omitted.]

[fol. 716] IN UNITED STATES DISTRICT COURT

[Title omitted]

PETITION FOR APPEAL—Filed January 22, 1937

To the Honorable Judge of Said Court:

The above named Plaintiffs, Erle P. Halliburton and Halliburton Oil Well Cementing Company, a corporation, feeling aggrieved by the Decree entered in the above entitled cause on the 23rd day of October, 1936, do Hereby Appeal from said Decree to the United States Circuit Court of Appeals for the Ninth Circuit for the reasons set forth in the assignments of error filed herewith and Pray that their appeal be allowed and that citation be issued as pro-

[fol. 717] vided by law, and that a transcript of the record, proceedings and documents upon which said Decree was based, duly authenticated, be sent to the United States Circuit Court of Appeals for the Ninth Circuit under the rules of such Court in such case made and provided.

And Your Petitioners Further Pray that the proper Order relating to the security to be required of them be made, all of which is respectfully submitted.

Erle P. Halliburton, Halliburton Oil Well Cementing Company, by Henry S. Richmond, Solicitors for Plaintiffs. Leonard S. Lyon, Richard F. Lyon, Henry S. Richmond, Solicitors and of Counsel for Plaintiffs.

[File endorsement omitted.]

[fol. 718] In United States District Court

Assignment of Errors—Filed January 22, 1937

Now Come the above-named plaintiffs, Erle P. Halliburton and Halliburton Oil Well Cementing Company, a corporation, and file the following assignment of errors, upon which they will rely upon the prosecution of the appeal in the above-entitled cause from the Final Decree entered and recorded on the 23rd day of October, 1936, by this Court dismissing plaintiffs' Bill of Complaint:

I

The Court erred in holding claims 8 to 19, inclusive, of the patent in suit invalid.

II

The Court erred in not holding claims 8 to 19, inclusive, of the patent in suit valid.

III

The Court erred in holding that neither of the defendants has infringed the patent in suit.

IV

The Court erred in not holding that each of the defendants has infringed claims 8 to 19, inclusive, of the patent in suit.

V

The Court erred in dismissing the bill of complaint and awarding costs of the suit to the defendants.

[fol. 719]

VI

The Court erred in denying plaintiffs the relief sought by their bill of complaint, and in not awarding costs to plaintiffs.

VII.

The Court erred in holding "That there was no actual commercial use of the device disclosed and claimed in the Simmons patent in suit. Such device was impractical and the inventor himself, within a month after the patent was taken over by the present owners, was employed to devise improvements in the valve structure of such device, due to the difficulty in operating it at increased depths."

VIII

The Court erred in not finding that the Letters Patent in suit went into immediate commercial use and established a new method and apparatus for testing formations of wells, which method and apparatus has become the standard method and apparatus employed in testing formations encountered in drilling oil wells throughout the oil producing fields of the United States, and that said invention has been and is of great benefit and has saved the oil industry millions of dollars.

IX

The Court erred in holding "That Franklin Patent No. 263,330, dated August 29, 1882, anticipates both the method and apparatus disclosed and claimed in the patent here in suit."

X

The Court erred in holding "That by using the device disclosed in said Franklin patent, a sample may be taken [fol. 720] out of the well uncontaminated by the contents of the hole above."

XI

The Court erred in not holding that the device of the Franklin patent was intended to prevent fluid from the well being carried out of the well upon the removal of the

device therefrom, and that in fact no sample could be taken out of the well by the Franklin device.

XII

The Court erred in holding "That the use of a packer, substantially as the same exists today, is necessarily implied from the language of such Franklin patent. This is also apparent from the contemporary literature on the subject descriptive of the state of the art. Without the use of a packer substantially as used today the Franklin device could not perform the functions attributed to it."

XIII

The Court erred in not holding that the packer referred to in the Franklin patent was a packer on the well casing and that such packer was neither disclosed nor intended by Franklin to be used on the pipe which contained the valve; and that the use of a packer upon the pipe containing the valve was not necessary to the operation of the Franklin device.

XIV

The Court erred in holding "That the device disclosed in said Franklin patent very plainly can be used as a tester for by its use the contents of the producing stratum, sealed off from the remainder of the well, unimpeded in its entry into the rat hole by pressure of the rotary mud, can be brought undiluted to the surface by a mechanism almost [fol. 721] duplicating that shown in the patent in suit."

XV

The Court erred in not holding that the device disclosed in said Franklin patent was intended for use in a well where there was no drilling fluid, and that it could not be used in a well containing drilling fluid as a tester; that it would require the addition of a packer not intended by Franklin for such device to be operated in a well-hole containing drilling fluid; that even by the addition of such packer the device disclosed in the Franklin patent could not remove an entrapped sample from the well-hole.

XVI

The Court erred in holding "That a device made in accordance with the teachings of said Franklin patent actually

has recently been used for the purpose of successfully making a water shut-off test and the same device would also successfully make a production test."

XVII

The Court erred in not holding that in order for the device of the Franklin patent to be used either for the purpose of a water shut-off test or a production test required the addition to the Franklin device of a packer not intended by Franklin and a reconstruction of the valve structure in order to permit the same to entrap a sample of fluid from the formation.

XVIII

The Court erred in holding "That Edwards Patent No. 1,514,585, dated November 4, 1924, substantially discloses the method and device disclosed and claimed in the patent in suit."

[fol. 722] XIX

The Court erred in not holding that the Edwards patent discloses an apparatus which requires the use of two tubes or pipes, while the patent in suit employs but a single pipe; that the Edwards patent describes an apparatus and method for testing wells by which a sample from the well is to flow through the pipe to the surface of the well while the patent in suit discloses a method and apparatus whereby a sample from the well may be entrapped in the pipe and raised to the surface with the apparatus so that the sample can be examined; the Edwards patent does not disclose a valve positively controlled by movement of the pipe or a valve having one part attached to the packer and another part to the pipe, as described and claimed in the Letters Patent in suit; that the apparatus and process of the Edwards patent was never actually employed and could not be successfully used for testing of oil wells.

XX

The Court erred in holding "That Cox Patent No. 1,347,534, dated July 27, 1920, also substantially discloses the method and device disclosed and claimed in the patent in suit."

XXI

The Court erred in not finding that the Cox patent No. 1,347,534 requires the use of two pipes or tubes, while the patent in suit employs but a single pipe; that the apparatus and process of the Cox patent discloses no valve, one part of which is attached to the packer and the other part to the pipe, or a valve positively controlled by movement of the pipe as described and claimed in the Letters Patent in suit; that the Cox patent does not disclose an apparatus and process adapted for removing an uncontaminated sample of fluid from the formation upon removal of the [fol. 723] apparatus, as described and claimed in the Letters Patent in suit.

XXII

The Court erred in holding "That the object of said Edwards and Cox patents was to ascertain what the stratum that was being drilled was producing, such object being precisely that of the patent in suit."

XXIII

The Court erred in not holding that the object of the method and apparatus of the patent in suit is to enable the removal of an uncontaminated entrapped sample of fluid from the formation to be tested, and that neither the Edwards nor Cox patents were capable of accomplishing this object.

XXIV.

The Court erred in holding "That the nature of the testing devices and methods of use disclosed in said Edwards and Cox patents, except as modified by the necessity of overcoming later difficulties, are the same as those disclosed and claimed in the patent in suit."

XXV

The Court erred in not finding that neither the Edwards nor Cox device or method ever went into actual use in the oil well industry; that each device or method required the use of two strings of pipe and no practical method or device for testing of wells can be used that employs more than a single string of pipe; that neither the device nor method disclosed by the Edwards or Cox patents is adapted to remove an uncontaminated entrapped sample of fluid from

a well and is not of value in the testing of wells; that the deficiencies of the Edwards and Cox patents are inherent in the disclosures of said patents and the success of the ap-
[fol. 724] paratus and process of the patent in suit is due to the invention and discovery first shown in that patent of the importance of the use of a single string of pipe in connection with a valve so designed as to be positively operated by the movement of that single string of pipe which was responsible for the revolution in the methods of testing formations; and that there were no changes in the conditions of drilling wells between the dates of the Edwards and Cox patents and the date of the Simmons invention which explained the success of the Simmons method and apparatus as compared with the failure of the Edwards and Cox methods and apparatus.

Wherefore, appellants pray that said Order be reversed and that said District Court of the Northern Division for the Southern District of California be ordered to enter its Decree holding the Simmons patent in suit, No. 1,930,987, valid and infringed as to Claims 8 to 19, inclusive, granting a perpetual injunction restraining defendants and those in active concert with them from infringing any of said claims of said patent here in suit and ordering an accounting for profits and damages herein, and for costs of suit herein.

Erle P. Halliburton, Halliburton Oil Well Cementing Company, by Henry S. Richmond, Solicitor for Plaintiffs. Lyon & Lyon, Leonard S. Lyon, Richard F. Lyon, Henry S. Richmond, Solicitors and of Counsel for Plaintiffs.

[File endorsement omitted.]

[fol. 725] IN UNITED STATES DISTRICT COURT

ORDER ALLOWING APPEAL WITH SUPERSEDEAS—Filed January 22, 1937

Considering the Petition for Appeal in the above entitled cause this day presented.

It is Ordered that an appeal be allowed to Erle P. Halliburton and Halliburton Oil Well Cementing Company, Petitioners therein and plaintiffs in this suit from the Final De-

cree rendered against said defendants in the above entitled and numbered cause, and that said appeal shall be returnable to the United States Circuit Court of Appeals for the Ninth Circuit, and that upon the execution of a bond in the penalty of One Thousand Dollars ($1000.00) said appeal shall operate as a supersedeas of said Decree and shall suspend until the Final Decree herein, the effect of the award of costs to defendant; and that a transcript of the record, testimony, exhibits, stipulations and all proceedings be filed in the United States Circuit Court of Appeals for the Ninth Circuit according to law as prayed for.

Dated at Los Angeles, California, January 22, 1937.

Geo. Cosgrave, U. S. District Judge.

[File endorsement omitted.]

[fol. 726] IN UNITED STATES DISTRICT COURT

STIPULATION CONCERNING PHYSICAL EXHIBITS—Filed March 4, 1937

It is Hereby Stipulated and Agreed by and between the parties hereto, through their respective attorneys, that each of the parties hereto will transport and have present at the court room of the United States Circuit Court of Appeals for the Ninth Circuit at San Francisco on the date of the argument of the appeal herein, all physical exhibits introduced by them at the trial of this cause in the District Court; that said physical exhibits may be used by either or both parties at the argument.

Dated at Los Angeles, California, this 3rd day of March, 1937.

Lyon & Lyon, Leonard S. Lyon, Henry S. Richmond, Solicitors and Counsel for Plaintiffs. Hill, Morgan & Bledsoe, by Kenneth K. Wright, A. W. Boyken, Solicitors and Counsel for Defendants.

Approved, March 4, 1937. Geo. Cosgrave, U. S. District Judge.

[File endorsement omitted.]

[fol. 727] IN UNITED STATES DISTRICT COURT

STIPULATION RE PRINTING AND FILING OF BOOK OF EXHIBITS ON APPEAL HERETOFORE TAKEN TO UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT—Filed March 10, 1937

It is Hereby Stipulated and Agreed by and between the parties to the above entitled cause, by their counsel, that the paper exhibits set forth and included in Paragraph XIV of plaintiffs' amended praecipe, shall not be printed in the Transcript of Record on Appeal herein taken, but shall be separately printed and included in a Book of Exhibits pursuant to the practice of said Appellate Court; five (5) copies to be printed for said Appellate Court and filed with the Clerk thereof at the time of filing the Transcript and docketing the cause in said Appellate Court, two (2) copies thereof to be furnished to counsel for defendants and such extra copies as plaintiffs may desire to be furnished their counsel, the cost of preparing and printing and certifying said Book of Exhibits and the contents thereof to be borne initially by plaintiffs.

The paper exhibits not to be included in the Book of Exhibits shall be transmitted by the Clerk of this Court to the Clerk of said Appellate Court as physical exhibits.

[fol. 728] Dated at Los Angeles, California, this 3rd day of March, 1937.

Lyon & Lyon, Leonard S. Lyon, Henry S. Richmond, Solicitors and Counsel for Plaintiffs. Hill, Morgan & Bledsoe, by Kenneth K. Wright, A. W. Boyken, Solicitors and Counsel for Defendants.

Approved, March 4, 1937. Geo. Cosgrave, U. S. District Judge.

Approved, March 5, 1937. Curtis D. Wilbur, Judge of the United States Circuit Court of Appeals for the Ninth Circuit.

[File endorsement omitted.]

[fols. 729-731] Supersedeas bond on appeal for $1,000.00, approved and filed January 22, 1937, omitted in printing.

[fol. 732] IN UNITED STATES DISTRICT COURT

PLAINTIFFS' AMENDED PRAECIPE FOR TRANSCRIPT OF RECORD ON APPEAL—Filed March 4, 193-

To the Clerk of Said Court:

SIR:

Please prepare and print transcript of the record on appeal in the above entitled cause to the United States Circuit Court of Appeals for the Ninth Circuit in Erle P. Halliburton Oil Well Cementing Co.'s appeal from the Final Decree entered herein on the 23rd day of October, 1936, such Transcript of Record on appeal to be made up of the following documents:—

I. Bill of Complaint filed November 3, 1933.
II. Defendants' Answer filed December 14, 1933.
III. Defendants' Amendment to the Answer filed October 14, 1935.
IV. Memorandum Opinion of Judge Cosgrave dated July 28, 1936.
V. Findings of Fact and Conclusions of Law filed October 23, 1936.
VI. Final Decree.
VII. Petition for Appeal.
VIII. Order allowing Appeal.
IX. Assignments of Error.
X. Bond on Appeal.
XI. Citation.
XII. Narrative Statement of Evidence filed herein this — day of March, 1937.
[fol. 733] XIII. Notice of lodgment of Narrative Statement of Evidence.
XIV. Nine (9) copies of Book of Exhibits to be made up of the following exhibits:

Plaintiffs' Exhibits

(1) Plaintiffs' Exhibit No. 1, copy of Simmons patent in suit, No. 1,930,987;

(2) Plaintiffs' Exhibit No. 2, certified copy of File Wrapper and contents of the Simmons Patent in suit, No. 1,930,987;

(3) Plaintiffs' Exhibit No. 4-A, certified copies of papers Nos. 1 and 39 in the Matter of the Interference of Williams, et al. vs. Simmons No. 55,940;

(4) Plaintiffs' Exhibit No. 4-B, certified copies of papers Nos. 1 and 40 in the Matter of the Interference of Williams, et al. vs. Simmons No. 55,941;

(5) Plaintiffs' Exhibit No. 3, certified copies of papers Nos. 40, 114, 119 and pages 1, 2 and 4 of the index of the Edwards vs. Simmons Interference No. 59,515;

(6) Plaintiffs' Exhibit No. 17, letter of District Judge Bryant of the Eastern District of Texas;

(7) Plaintiffs' Exhibit No. 6, certified copy of Interlocutory Decree in Texas case;

(8) Plaintiffs' Exhibit No. 11, print of drawing marked No. 60 illustrating setting of tester at bottom of well;

[fol. 734] (9) Plaintiffs' Exhibit No. 15, drawing of "J" type tool;

(10) Plaintiffs' Exhibit No. 18, receipt of Eby Engineering Company;

(11) Plaintiffs' Exhibit 19, diagram in explanation of Franklin patent;

(12) Plaintiffs' Exhibit 20, reprint from Oil Weekly of October 2, 1925;

(13) Plaintiffs' Exhibit No. 16-B, drawing attached to defendants' answers to plaintiffs' interrogatories;

(14) Plaintiffs' Exhibit No. 16-C, drawing attached to defendants' answers to plaintiffs' interrogatories;

(15) Plaintiffs' Exhibit No. 16-D, drawing attached to defendants' answers to plaintiffs' interrogatories.

Defendants' Exhibits

(16) Defendants' Exhibit A., certified copy of abandoned application of Erle P. Halliburton filed December 28, 1926, Ser. No. 157,573 entitled "Improvement in Well Testing Device";

(17) Defendants' Exhibit C., blueprint of parts of "J" type tool;

(18) Defendants' Exhibit H-1, copy United States Letters Patent No. 46,124, Lyons, issued January 31, 1865;

[fol. 735] (19) Defendants' Exhibit H-2, copy United States Letters Patent No. 56,234, Latham, issued July 10, 1866;

(20) Defendants' Exhibit H-3, copy United States Letters Patent No. 58,837, Kewley, issued October 16, 1866;

(21) Defendants' Exhibit H-4, copy United States Letters Patent No. 68,350, Burr & Wakelee, issued September 3, 1867;

(22) Defendants' Exhibit H-5, copy United States Letters Patent No. 73,577, Carll, issued January 21, 1868;

(23) Defendants' Exhibit H-6, copy United States Letters Patent No. 182,098, Birge, issued September 12, 1876;

(24) Defendants' Exhibit H-7, copy United States Letters Patent No. 208,610, Koch, issued October 1, 1878;

(25) Defendants' Exhibit H-8, copy United States Letters Patent No. 249,228, Dower, issued November 8, 1881;

(26) Defendants' Exhibit H-9, copy United States Letters Patent No. 263,330, Franklin, issued August 29, 1882;

(27) Defendants' Exhibits H-10, copy United States Letters Patent No. 582,828. McGregor, issued May 18, 1897;

(28) Defendants' Exhibit H-11, copy United States Letters Patent No. 785,933, Bloom, issued March 28, 1905;

[fol. 736] (29 Defendants' Exhibit H-12, copy United States Letters Patent No. 1,000,583, Cooper, issued August 15, 1911;

(30) Defendants' Exhibit H-13, copy United States Letters Patent No. 1,347,534, Cox, issued July 27, 1920;

(31) Defendants' Exhibit H-14, copy United States Letters Patent No. 1,474,630, Halliday, issued November 20, 1923;

(32) Defendants' Exhibit H-15, copy United States Letters Patent No. 1,510,669, Halliday, issued October 7, 1924;

(33) Defendants' Exhibit H-16, copy United States Letters Patent No. 1,514,585, Edwards, issued November 4, 1924;

(34) Defendants' Exhibit H-17, copy United States Letters Patent No. 1,522,197, Macready, issued January 6, 1925;

(35) Defendants' Exhibit I-1, reports of Carll;

(36) Defendants' Exhibit I-2, article by Peckham;

(37) Defendants' Exhibit I-3, article by Chamberlain;

(38) Defendants' Exhibit R, Patent No. 1,901,813, issued March 14, 1933, to M. O. Johnston, assignor of one-third to Gilson M. Jones and one-third to Francis C. Van Deinse;

(39) Defendants' Exhibit S, Patent No. 1,842,270 issued

to M. O. Johnston, assignor to Johnston Formation Testing Corporation, Ltd.;

[fol. 737] (40) Defendants' Exhibit U, Patent No. 1,709,940 to Edgar Clinton Johnston, issued April 23, 1929;

(41) Defendants' Exhibit V, Patent No. 1,790,424, to Edgar C. Johnston, issued January 27, 1931;

(42) Defendants' Exhibit Y, Patent No. 1,715,504 dated June 4, 1929, to James L. Johnston, Edgar C. Johnston and Blaine Johnston.

XV. Stipulation providing for printing Book of Exhibits.

XVI. This amended praecipe.

XVII. Stipulation providing for the transmittal of original exhibits to Circuit Court of Appeals.

XVIII. Stipulation extending time within which to prepare record and docket appeal.

Dated this 3rd day of March, 1937.

Lyon & Lyon, Leonard S. Lyon, Henry S. Richmond, Attorneys for Plaintiffs-Appellants.

[Endorsed]: Due service and receipt of a copy of the within Amended Praecipe is hereby admitted this 3rd day of March, 1937. A. W. Boyken, Hill, Morgan & Bledsoe atty for defendants.

[fols. 738-742] Clerk's certificate to foregoing transcript omitted in printing.

[fol. 743] In United States Circuit Court of Appeals for the Ninth Circuit

Before Wilbur, Haney and Stephens, Circuit Judges

Order of Submission—April 8, 1938

Order appeal in above cause argued by Mr. Leonard S. Lyon, counsel for appellants, and by Mr. A. W. Boyken, counsel for appellees, and submitted to the court for consideration and decision.

In United States Circuit Court of Appeals for the Ninth Circuit

Order Directing Filing of Opinion and Filing and Recording of Decree—July 11, 1938

By direction of the Court, ordered that the typewritten opinion this day rendered by this Court in above cause be forthwith filed by the clerk, and that a decree be filed in [fol. 744] above cause and recorded in the minutes of this Court in accordance with the opinion rendered.

In United States Circuit Court of Appeals

Opinion—Filed July 11, 1938

Before Wilbur, Haney and Stephens, Circuit Judges

Wilbur, Circuit Judge:

This is an appeal from a final decree of the District Court holding patent No. 1,930,987 "and particularly claims 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 invalid for want of invention", and not infringed by appellees.

The patent in suit was issued to John T. Simmons on October 17, 1933 on an application filed February 10, 1926 and is for a method and apparatus for testing the productivity of formations encountered in drilling an oil well. Claims 8 and 18 are method claims and claims 9, 10, 11, 12, 13, 14, 15, 16, 17, and 19 are apparatus claims. The apparatus includes a pipe or casing, the end of which is perforated, which is lowered into an uncased extension of the well bore of reduced diameter (called a "rat hole") for testing the formation for gas or liquid. Near the lower end of the pipe, but above a packer, a valve is provided which [fol. 745] can be manipulated from the surface of the well to either close or pen the interior of the pipe to the fluids of the formation which enter through the strainer from the "rat hole". When the perforated end of the pipe, or "strainer", is placed in the rat hole the valve in the pipe is opened to the atmospheric pressure while the pressure of the mud-laden fluids in the well is sealed off from the rat hole by a "frusto-conical shaped" packer that is adapted to wedge in the upper end of the "rat hole". (Fig. 1)

(Here follows one photolithograph, side folio 746)

The patent drawings are shown below in Fig. 1.

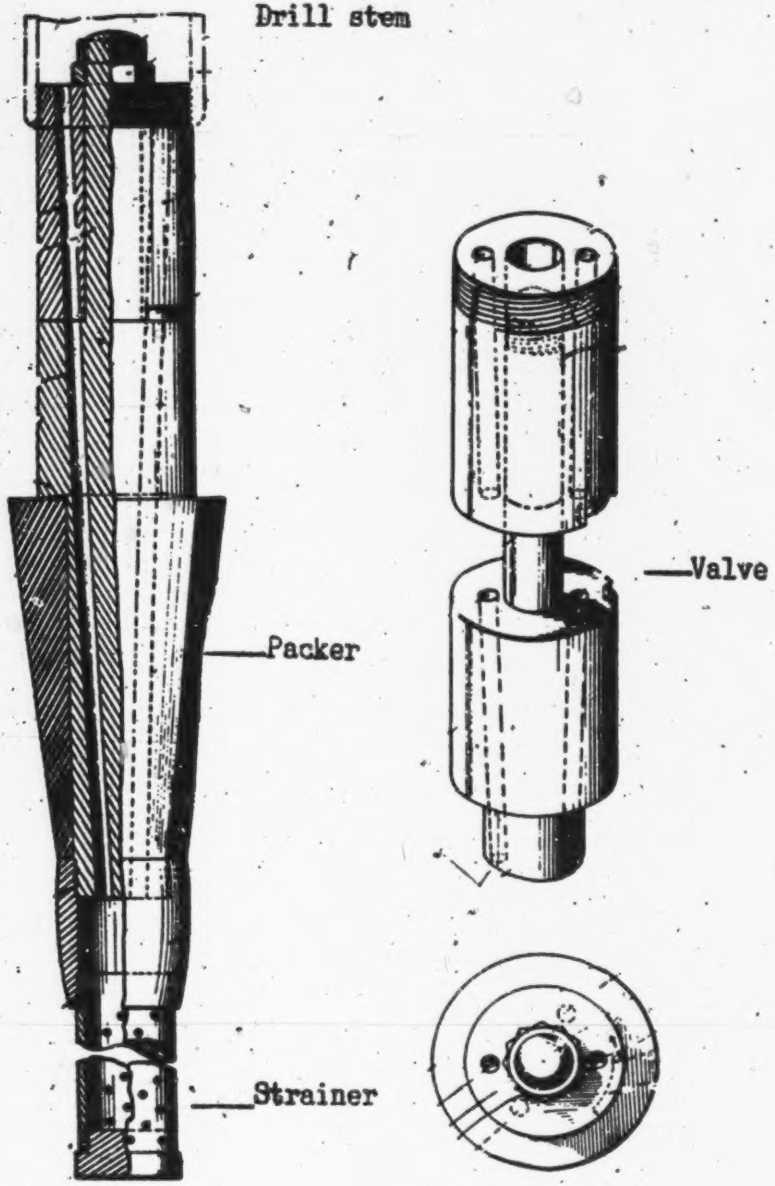

Fig. 1.

[fol. 747] The appellants claim that their patent is basic and revolutionary for both process and apparatus. The problem to be solved was that of testing the formation without withdrawing the drilling fluid and without maintaining the circulation thereof. The drilling fluid in rotary dril-ing is used to keep its hydrostatic pressure against the walls of the drill hole behind and below the unset casing so as to prevent the formation from caving in or being blown in by gas or being forced in by gas, water or oil pressure. The drilling fluid has a specific gravity in excess of water (1.2 or over) and thus will balance the pressure of liquid water or oil in the formation. It also tends to plaster mud against the exposed face of the formation, and to penetrate its recesses and thus to block off pressure. Prior to the patented method in suit tests were made by cementing a casing in the well and emptying the well of the drilling fluids by bailing and swabbing. The operator could then determine whether a productive formation was reached by observing whether or not gas or oil flowed over the top of the well or by pumping the well if the flow was not sufficient to reach the top. This method of testing was both expensive and detrimental to the well for if the test failed to show productive quantities of oil had been reached further drilling operations had to be carried on at reduced diameter.

The idea of the industry was that if the pressure of the drilling fluid was removed by pumping or bailing cave-ins against the casing might prevent further deepening of the [fol. 748] well with that diameter of the casing, and if the drill stem and drill were in the well after the drilling fluid was removed cave-ins against the drill stem and drill below the casing might prevent their withdrawal. When the scheme was considered of testing a well without the removal of, or the circulation of, the drilling fluid, the idea was rejected because the plan called for a packer at the top of the rat hole and it was believed that the cave-ins above the packer would prevent the withdrawal of the drill stem. Earlier inventors had approached the problem with this thought in view and had provided two strings of pipe, an outer string and an inner string. (Patent No. 1,347,534 granted E. H. Cox July 27, 1920, Patent No. 1,514,585 granted C. R. Edwards, November 4, 1924). The outer string of pipe was used to provide for circulation of the fluids in the well, to prevent crumbling of the walls of the well down over the packer. The evidence shows that the

use of two strings of pipe as disclosed by these patents was not practical. These patents do not disclose the use of the patented process in suit where only a single string of pipe is used and do not anticipate the Simmons patent. By the use of the process in suit it was found that the use of a single string of pipe for taking an entrapped sample was successful and practical.

The prior art chiefly relied upon as anticipating the patent in suit is patent No. 263,330 granted to Benjamin Franklin August 29, 1882 for a device for controlling and [fol. 749] regulating the flow of oil wells, an analogous art. The device disclosed by this patent is a valve connected with a well tubing, or pipe, constructed to be placed in a well and operated manually to regulate the flow of the well. The patentee states that the device "can be connected with the tubing of the well, either within or without the well, but preferably within at a point above the packer. * * *" The valve structure includes a disk with a half-circle opening in it which lies on a shoulder in the lower half of the valve. It is designed so that the opening in the disk registers with a corresponding opening in the upper part of the valve. The disk in the preferred form of construction pointed out by the patentee is set loosely between the two parts of the valve having pins connecting it with the lower part of the valve which prevent it from turning around but allow it to move vertically. The patent also teaches that the disk may be attached solid to the lower part of the valve and states that "it is better to be loose, as shown; but whether seated loosely and held by pins or lugs, or forming an actual part of the part B, it is in fact a part of the lower half of the valve."

Does the Franklin patent disclose the patented device in suit? Appellants contend that the device disclosed by the Franklin patent is incapable of taking an entrapped sample because it does not appear from the patent that a packer was located on the tubing to seal off the formation below the packer and because the Franklin valve would leak upon removal of the tubing from the well.

[fol. 750] Much of the argument as to the Franklin patent centers upon the question of whether or not the Franklin patent contemplates the use of a packer upon the tubing in which he sets his valve. That Franklin contemplated the existence and use of a packer is clearly stated in his patent. As we have pointed out, Franklin states that his valve de-

vice can be connected with the tubing in the well, either within or without the well, "but preferably at a point above the packer". The appellees claim that the packer referred to by Franklin is on the tubing, and that this was understood by those familiar with the art. In support of their contention they produced a government publication, "The Tenth Census of the United States", containing a report by S. F. Peckham "on the production, technology and uses of petroleum and its products". Therein is a diagram of a flowing oil well showing an oil well tube extending far below the bottom of the oil casing and into the oil sand with a packer on the tubing above the oil sand, closing off the upper part of the well so that the oil would be compelled to ascend through the tubing. As the packer was well known and in constant use, Franklin made no claim for it or about its use. Upon the theory that the Franklin device contemplated a packer below its valve, the appellees have constructed a device on the Franklin specifications plus the packer and have used the device successfully to make a water shut-off test in an oil well about 1600 feet in depth. [fol. 751] To meet the obvious conclusions that Franklin contemplated a packer to keep back the gas and to force the gas and oil up through the tubing of the Franklin device, the appellants contend that the packer referred to by Franklin was one at the bottom and outside of the well casing placed there to shut off the water from the formations above. Appellants' witness Halliburton claimed that Franklin contemplated a casing housed over at the top above the surface by a dome or cover thus making the entire casing a gas chamber in which to build up gas pressure. Halliburton's conception of the Franklin device is shown by the following drawing presented by him (Fig. 2).

(Here follows one photolithograph, side folio 752)

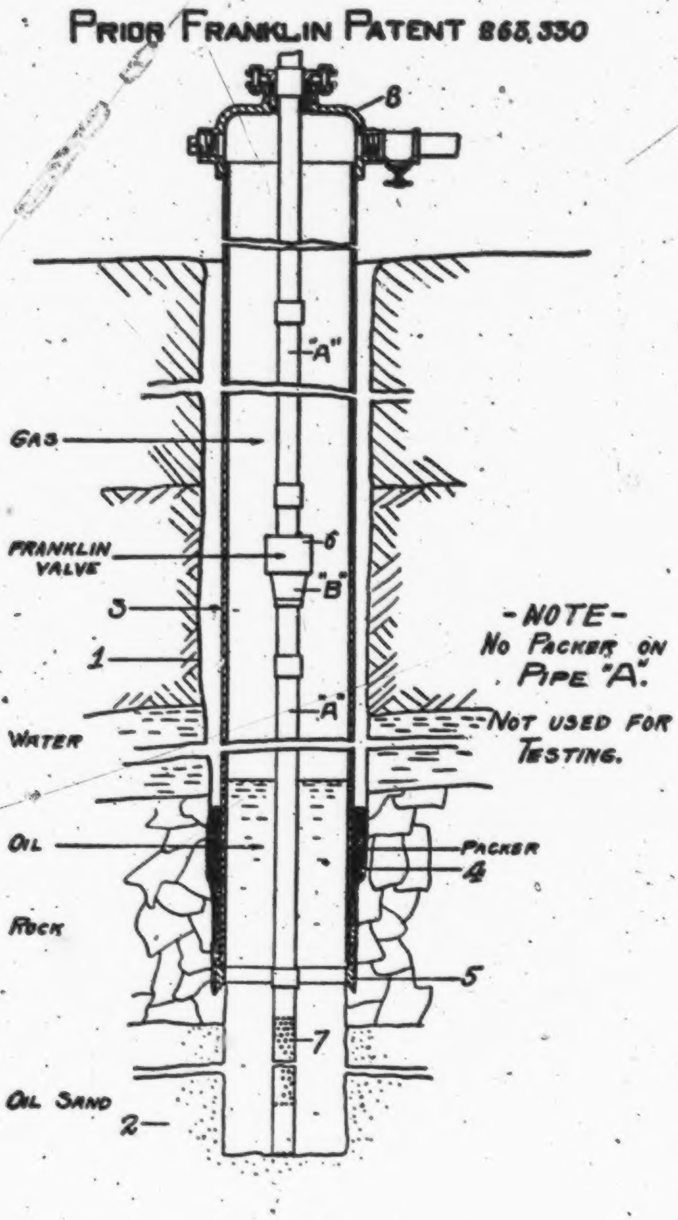
PRIOR FRANKLIN PATENT 868,330
8
"A"
GAS
FRANKLIN VALVE
6
"B"
3
1
"A"
-NOTE-
NO PACKER ON PIPE "A".
NOT USED FOR TESTING.
WATER
OIL
PACKER
4
ROCK
5
7
OIL SAND
2

Fig. 2.

[fol. 753] While this is an ingenuous attempt to explain the operation of the Franklin device without using a packer on the oil tube *below* * the Franklin valve, it finds no support in the language of the patent. If Franklin had contemplated using his device without a packer as suggested by the appellants, then any sort of a shut-off valve in the tube protruding from the dome would have been sufficient for his purpose. His purpose in using a packer on the tube below the valve was to close the space between the tube and the casing, thus avoiding the possible loss of gas pressure which might otherwise result from the leakage of gas through the joints of the casing and of the tube if he had merely housed over the casing projecting above the surface of the ground and used no packer, as witness Halliburton claims he intended.

The appellant Halliburton, who qualified as an expert patent lawyer and mechanical engineer familiar with the oil industry, testified that if the Franklin device was equipped with a packer and used to test the formation in accordance with the appellant's patent, it would infringe the latter. As we hold that the Franklin device contemplated the use of a packer below the valve to close the upper part of the casing or well from the lower, this testimony is equivalent to saying that the Franklin device anticipated that of the appellants unless there is something involving patentable novelty in the use of the Franklin device for [fol. 754] testing a well instead of for augmenting and regulating the flow of a well. Appellants also claim, however, that the valve of the Franklin device will not retain an entrapped sample because one disk of the valve is designed to be held in place by the upward pressure of the gas in the well, and has a slight vertical motion, evidently designed to reduce friction and facilitate the rotation of the upper part of the valve. When the valve is closed the disk, unless sustained in position, will drop down and allow the contents of the tube to escape as soon as the weight of the entrapped sample equals or exceeds the upward pressure of the gas. To this proposition two answers are advanced. The first, that it does not involve invention to tighten what would otherwise be a leaky valve. This view was expressed by

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* Italics are by the Court.

the trial court and following its decision, by the Circuit Court of Appeals for the Fifth Circuit, which held the process claims of the patent in suit to be void. Johnston Formation Testing Corp. v. Halliburton, 88 F. 2d. 970. A second answer is that Franklin in his patent, while showing a valve with a disk having vertical play in his drawings and specifications, expressly states that the lower disk may be secured to the lower part of the valve. It is clear that Franklin did not limit his invention, or its description to the vertically movable disk. Moreover, the Franklin device built tried and tested by the appellees recovered an entrapped sample.

It is clear that no invention would be involved in tightening what otherwise would be a leaky valve and more-[fol. 755] over the Franklin patent disclosed a valve operated by movement of the pipe that did not leak. We conclude that the apparatus claims of the patent in suit were anticipated by the patent to Franklin.

Although we hold that the Franklin device anticipates the combination claims of appellants' patent and could be used in carrying out the patented process, this holding does not negative invention as to the process claims in suit. The apparatus used in carrying out a process may be old and yet the process valid. (Expanded Metal Co. v. Bradford, 214 U. S. 366, 53 L. Ed. 1034, 1040; Carnegie Steel Co. v. Cambria Iron Co., 185 U. S. 403.) Does the Franklin patent disclose the process in suit? Franklin directs that the pipe be lowered into the well and the valve operated by movement of the pipe to control the flow of oil. The patent also teaches that the tube can be kept empty by keeping the valve closed while it is being lowered and that the valve also should be closed prior to the removal of the tubing.

The Franklin device was to be used in a flowing oil well. Such a well, of course, contains no drilling fluid. Moreover, at the time of the Franklin patent, the rotary method of drilling was unknown. The purposes of the Franklin patent were two-fold: First, to provide a method of keeping the tubing of the well closed while it was being lowered into the well or removed therefrom, and second, to provide means of temporarily closing the tubing to allow the gas in the well to obtain sufficient head so that the well would [fol. 756] flow. There is no use disclosed of taking an entrapped sample from an unfinished well containing drill-

ing fluid. The device was evidently intended to be permanently attached to the tubing of the well. There is no suggestion of the last step of the patented process in suit, that is, the taking of an entrapped sample from an incomplete well containing drilling fluid.

As we have stated, Simmons faced the problem of providing a method of testing an oil well without removing the hydrostatic pressure necessary for supporting the formation in place. He met this problem by providing a method operating so quickly that the suspension of the circulation of drilling fluid was not substantially greater than that frequently necessary in drilling operations. Franklin neither considered nor solved this problem.

This discovery constituted invention for it disclosed what had not been thought possible in the art, that is, that such a device could be set in a well containing drilling fluid while there was no circulation thereof long enough to make a test. It substituted a much better process than had hitherto been in use. The patentee discovered that a well could be safely tested by the lowering of a single string of pipe equipped with a valve packer and strainer and that it was not necessary to set the casing permanently and bail out the drilling fluid, or, if a test were attempted without permanently setting the casing that it was not necessary to provide an extra string of pipe for circulation of the drill- [fol. 757] ing fluid. See, Pacific Contracting Co. v. Bingham, 62 F. 281; Tarr v. Folsom, Fed. Cas. No. 13,756; Lawther v. Hamilton, 124 U. S. 1. In Lawther v. Hamilton, the patentee had discovered that in treating ole-ginous seeds for the purpose of extracting oil therefrom, more advantageous results were attainable by dispensing with the use of muller stones in crushing the seeds. The lower court had held that this discovery was not of a new series of acts or steps constituting a process but only of certain mechanical changes in carrying into effect well known steps of the process. In regard to this holding, the Supreme Court said:

"The view thus taken by the court below seems to us open to some criticism. If, as that court says, and we think rightly says, the omission of the muller stones is a real improvement in the process of obtaining the oil from the flaxseed, if it produces more oil and better oil cakes, and it is new, and was not used before, why is it not a patentable

discovery? And why is not such new method of obtaining the oil and making the oil cakes a process? There is no new machinery. The rollers are an old instrument, the mixing machinery is old, the hydraulic press is old; the only thing that is new is the mode of using and applying these old instrumentalities. And what is that but a new process? This process consists of a series of acts done to the flaxseed. It is a mode of treatment. The first part of the process is to crush the seeds between rollers. Perhaps, as this is the only breaking and crushing of the seed [fol. 758] which is done, the rollers are required to be stronger than before. But if so, it is no less a process."

Appellee further contends that the process claims are invalid because specifying apparatus to be used in the process and because, it is claimed, the process is the mere function of a machine. These contentions are without merit. A patent is not invalid because requiring specific apparatus in carrying it out. Expanded Metal Co. v. Bradford, 214 U. S. 366, 53 L. Ed. 1034; Lawther v. Hamilton, 124 U. S. 1, supra; Owen v. Perkins Oil Well Cementing Co., 38 F. (2d) 30. The process in suit is not the function of a machine; it requires manual operation. We conclude that the process disclosed in claims 8 and 18 is valid.

Infringement

We hold that the appellees infringed the process claims of the patent in suit. All the steps of the claims in suit are employed by the appellee although the main valve of the appellees' device (which corresponds to the valve in the patent in suit) is opened by vertical movement of the drill pipe while the patented device is opened by a horizontal rotation of the pipe. The fact that the device used by appellees contained auxiliary valves (trip valve to take care of the contingency of main valve opening while being lowered, the equalizing valve, a device to lessen the pull required to unseat the packer, a circulating valve used in an emergency when it is necessary to abandon the test) does not avoid infringement, as the primary process of appel- [fol. 759] lants is employed. They constitute improvements in the device used to practice the patented process.

We find that the Honolulu Oil Corporation participated jointly in infringement in using the process on the wells drilled by it. We hold that there was infringement of the

process by the Honolulu Oil Corporation as well as by appellee M. O. Johnston Oil Field Service Corporation.

Reversed and remanded for proceedings not inconsistent herewith.

[File endorsement omitted.]

IN UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

No. 8653

ERLE P. HALLIBURTON et al., Appellants,

vs.

HONOLULU OIL CORPORATION et al., Appellees

DECREE—Filed July 11, 1938

Appeal from the District Court of the United States for the Southern District of California, Northern Division.

This Cause came on to be heard on the Transcript of the Record from the District Court of the United States for the Southern District of California, Northern Division, and was duly submitted:

[fol. 760] On Consideration Whereof, it is now here ordered, adjudged, and decreed by this Court, that the decree of the said District Court in this cause be, and hereby is, reversed with costs in favor of the appellants and against the appellees, and that this cause be, and hereby is remanded to the said District Court for further proceedings not inconsistent with the opinion of this court.

It is Further Ordered, Adjudged, and Decreed by this Court, that the appellants recover against the appellees for their costs herein expended, and have execution therefor.

[File endorsement omitted.]

IN UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

ORDER DENYING PETITION FOR REHEARING—September 12, 1938

Upon consideration thereof, and by direction of the Court, It Is Ordered that the petition of appellees, filed August

10, 1938, and within time allowed therefor by rule of court, for a rehearing of above cause, be, and hereby is denied.

[fol. 761] IN UNITED STATES CIRCUIT COURT OF APPEALS

ORDER STAYING ISSUANCE OF MANDATE—Filed September 13, 1938

Upon application of A. W. Boyken, Esq., counsel for the appellees, and good cause therefor appearing, It Is Ordered that the issuance, under Rule 32, of the mandate of this Court in the above cause be, and hereby is stayed to and including October 17, 1938; and in the event the petition for a writ of certiorari to be made by the appellees herein be docketed in the Clerk's office of the Supreme Court of the United States on ~~or~~ before said date, then the mandate of this Court is to be stayed until after the said Supreme Court passes upon the said petition.

William Denman, United States Circuit Judge.

Dated: San Francisco, California, September 13, 1938.

[fol. 762] Clerk's certificate to foregoing transcript omitted in printing.

[fol. 763] IN UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

[Title omitted]

ORDER STAYING ISSUANCE OF MANDATE—Filed October 3, 1938

Upon application of Mr. A. W. Boyken, counsel for the appellees, and good cause therefor appearing, it is Ordered that the issuance, under Rule 32, of the mandate of this Court in the above cause be, and hereby is stayed to and including November 14, 1938; and in the event the petition for a writ of certiorari to be made by the appellees herein be docketed in the Clerk's office of the Supreme Court of the United States on or before said date, then the man-

date of this Court is to be stayed until after the said Supreme Court passes upon the said petition.

Francis A. Garrecht, United States Circuit Judge.

Dated, San Francisco, California, October 3, 1938.

[File endorsement omitted.]

[fol. 764] SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1938

No. 466

ORDER ALLOWING CERTIORARI—Filed December 19, 1938

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Ninth Circuit is granted.

And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

[fol. 765] SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1938

No. 479

ORDER ALLOWING CERTIORARI—Filed December 19, 1938

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Ninth Circuit is granted.

And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

/65

175244 / S.C

Vol. II

TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1938

No. 466

HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION, PETITIONERS,

vs.

ERLE P. HALLIBURTON AND HALLIBURTON OIL WELL CEMENTING COMPANY

No. 479

ERLE P. HALLIBURTON AND HALLIBURTON OIL WELL CEMENTING COMPANY, PETITIONERS,

vs.

HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

PETITION FOR CERTIORARI FILED NOVEMBER 8, 1938.
PETITION FOR CERTIORARI FILED NOVEMBER 18, 1938.

CERTIORARI GRANTED DECEMBER 19, 1938.

Supreme Court of the United States

October Term, 1938.

No.____________

HONOLULU OIL CORPORATION, LTD., a Corporation, and M. O. JOHNSON OIL FIELD SERVICE CORPORATION, a Corporation,

Petitioners,

vs.

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY, a Corporation,

Respondents.

Book of Exhibits
Accompanying
Transcript of Record

No.

In the United States
Circuit Court of Appeals
For the Ninth Circuit.

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY, a corporation,

Appellants,

vs.

HONOLULU OIL CORPORATION, LTD., a corporation, and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION, a corporation,

Appellees.

VOLUME 2
Book of Exhibits
Accompanying
Transcript of Record

Upon Appeal from the District Court of the United States for the Southern District of California, Northern Division.

Parker & Baird Company, Law Printers, Los Angeles.

INDEX TO BOOK OF EXHIBITS.

Defendants' Exhibits (cont.) PAGE

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of the

Letters Patent of

John T. Simmons,

assignor, by direct and mesne assignments, to

Erle P. Halliburton,

Number 1,930,987, Granted October 17, 1933,

for

Improvement in Methods and Apparatus for Testing the Productivity of Formations Encountered in Wells.

No. D-56-Eq
Halliburton et al
vs.
Honolulu Oil Corp.
Plfs EXHIBIT
No. 1
Filed 11/11 1935
R. S. ZIMMERMAN, Clerk
By Cross
Deputy Clerk

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this twenty-sixth day of October, in the year of our Lord one thousand nine hundred and thirty-five and of the Independence of the United States of America the one hundred and sixtieth.

ATTEST:

Chief of Division

N°

1930987

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Whereas JOHN T. SIMMONS, of El Dorado, Arkansas, assignor, by direct and mesne assignments, to ERLE P. HALLIBURTON, of Los Angeles, California,

PRESENTED TO THE **Commissioner of Patents** A PETITION PRAYING FOR THE GRANT OF LETTERS PATENT FOR AN ALLEGED NEW AND USEFUL IMPROVEMENT IN

METHODS AND APPARATUS FOR TESTING THE PRODUCTIVITY OF FORMATIONS ENCOUNTERED IN WELLS,

A DESCRIPTION OF WHICH INVENTION IS CONTAINED IN THE SPECIFICATION OF WHICH A COPY IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND COMPLIED WITH THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED, AND

Whereas UPON DUE EXAMINATION MADE THE SAID CLAIMANT is ADJUDGED TO BE JUSTLY ENTITLED TO A PATENT UNDER THE LAW.

NOW THEREFORE THESE **Letters Patent** ARE TO GRANT UNTO THE SAID

Erle P. Halliburton, his heirs OR ASSIGNS

FOR THE TERM OF SEVENTEEN YEARS FROM THE DATE OF THIS GRANT

THE EXCLUSIVE RIGHT TO MAKE, USE AND VEND THE SAID INVENTION THROUGHOUT THE UNITED STATES AND THE TERRITORIES THEREOF.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington this seventeenth day of October in the year of our Lord one thousand nine hundred and thirty-three, and of the Independence of the United States of America the one hundred and fifty-eighth.

(SEAL)

Attest:

G. P. Tucker

Law Examiner.

Conway P. Coe

Commissioner of Patents.

METHOD AND APPARATUS FOR TESTING THE PRODUCTIVITY
OF FORMATIONS ENCOUNTERED IN WELLS

Filed Feb. 10, 1926

Fig. 1.

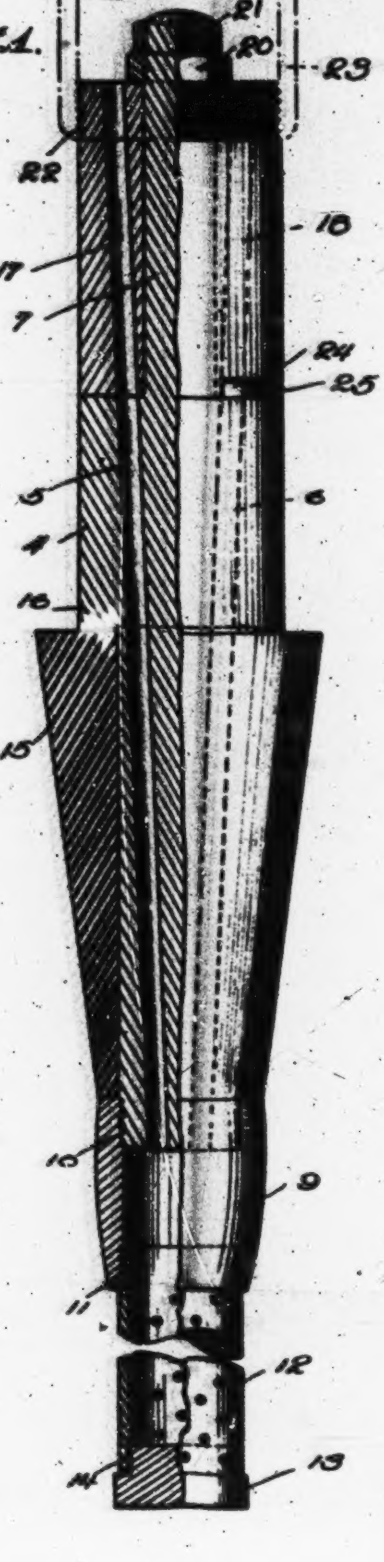


Fig. 2.

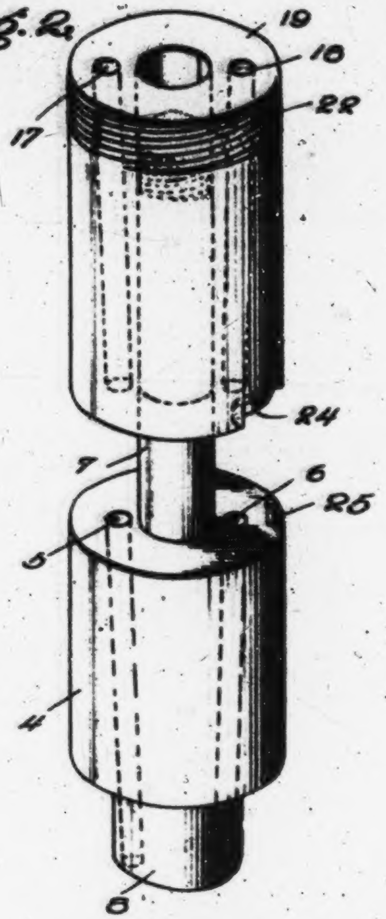
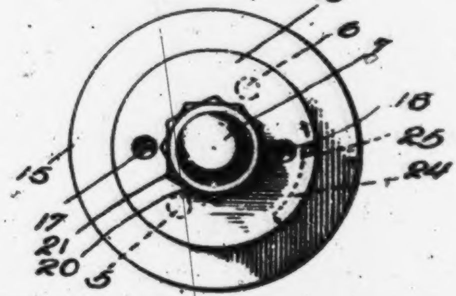


Fig. 3.



Inventor

John T. Simmons

By Wilkinson & Giusta

Attorneys

Fig. 1.

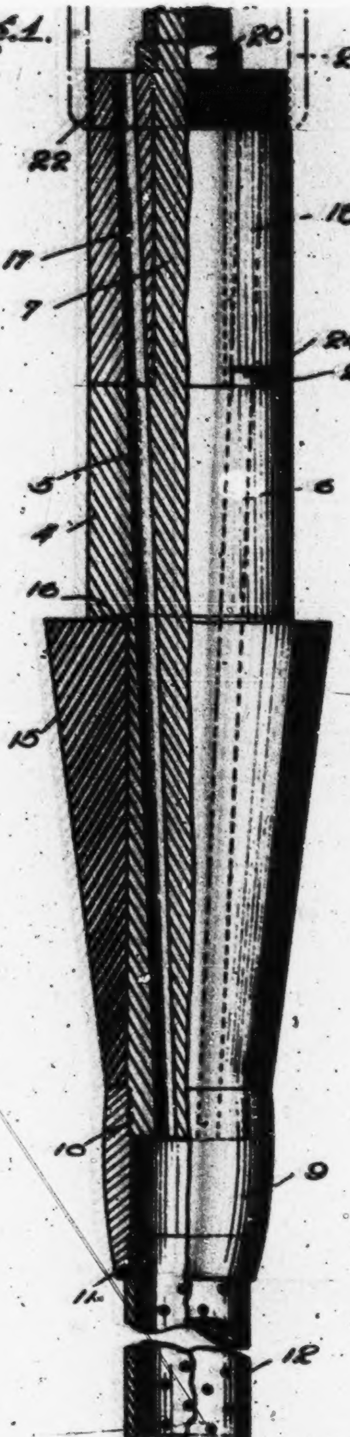


Fig. 2.

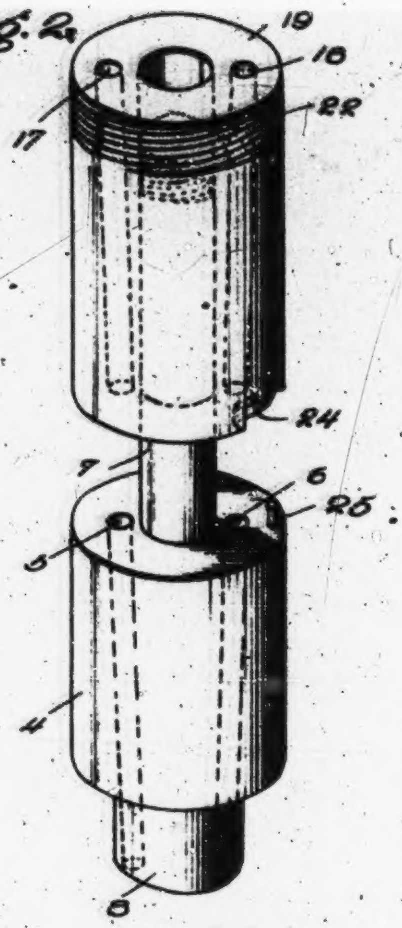
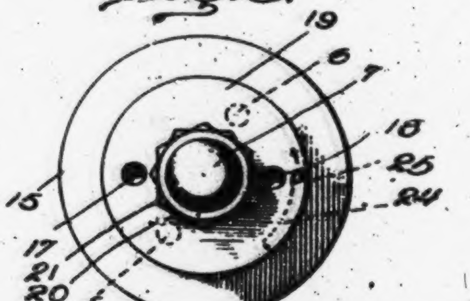


Fig. 3.



Inventor

John T. Simmons

By Wilkinson & Giusta

Attorneys

Patented Oct. 17, 1933

1,930,987

UNITED STATES PATENT OFFICE

1,930,987

METHOD AND APPARATUS FOR TESTING THE PRODUCTIVITY OF FORMATIONS ENCOUNTERED IN WELLS

John T. Simmons, El Dorado, Ark., assignor, by direct and mesne assignments, to Erle P. Halliburton, Los Angeles, Calif.

Application February 10, 1926. Serial No. 87,222

19 Claims. (Cl. 166—1)

The present invention relates to methods and apparatus for testing the productivity of formations encountered in drilling oil and other deep wells, and refers particularly to methods and apparatus employed when such wells are drilled by the rotary method.

In the rotary method of drilling wells, the well is kept filled with a mud-laden fluid. This mud-laden fluid is employed for the purpose of carrying away the detritus formed by the cutting bit and for maintaining a hydraulic pressure upon the sides of the hole, which prevents the hole from caving. In most wells drilled by the rotary process, it is impossible, without danger to the hole, to remove the mud-laden fluid without providing some other support to conserve the hole bore. The hydraulic pressure of the mud-laden fluid in the well is very great, being often in excess of two thousand pounds per square inch. In most instances, this pressure is in excess of the head upon the cognate fluids, either oil, water or gas, encountered in the formations penetrated by the drill. Under these circumstances, while drilling there may be no indication whatever at the surface of the well of the productivity or even existence of such cognate fluids. It is therefore necessary to perform a special testing operation whenever it is desired to determine whether such a formation contains a fluid which upon removal of the pressure of the mud-laden fluid will enter the well bore.

Under the present practice, when making such a test, it is necessary to remove the mud-laden fluid from the well bore until the hydraulic head of liquid within the well is sufficiently below the head of the cognate fluids in the formation in order to allow this latter fluid to enter the well bore. In order that this mud-laden fluid may be removed from the well bore without danger of the well caving in, it is the general practice to set a string or strings of casing in the well so that this string or strings of casing may support the wall of the well when the mud-laden casing is then known as a water string. In testing a well, the hole below the bottom of this water string is then protected by another string set inside the water string.

In case the test develops that the formation tested is barren or not commercially productive or contains water and it is therefore desired to deepen the hole, it is necessary to refill the hole with mud-laden fluid, to remove if possible the inner perforated string, and to resume drilling. The cemented water string, however, must be left in the hole, which not only entails the cost of this string but decreases the size of the hole which can be thereafter drilled. If the testing operation is repeated with the setting of successive water strings, the size of the hole may ultimately become too small for successful drilling operations and attempts to drill deeper must therefore be abandoned.

An object of the present invention is to provide a method and apparatus for testing formations which is cheaper, quicker and more effective than the methods now in use. More particularly an object of the present invention is to provide a method and apparatus for testing the formations penetrated by a drill, which method and apparatus may be employed without the necessity of removing the mud-laden fluid from the well bore.

Another object of my invention is to provide a method and apparatus for testing formations being penetrated by a drill, which method and apparatus does not require the setting of a water string above the formation to be tested and thus permits the testing of a well without involving the cost of such water string.

Another object of my invention is to provide a method and apparatus for testing formations being pentrated by a drill, which method and apparatus does not entail decreasing the size of the well bore.

Another object of my invention is to provide a method and apparatus for obtaining a sample of the cognate fluid in the formation to be tested

METHOD AND APPARATUS FOR TESTING THE PRODUCTIVITY OF FORMATIONS ENCOUNTERED IN WELLS

John T. Simmons, El Dorado, Ark., assignor, by direct and mesne assignments, to Erle P. Halliburton, Los Angeles, Calif.

Application February 10, 1936. Serial No. 57,223

19 Claims. (Cl. 166—1)

The present invention relates to methods and apparatus for testing the productivity of formations encountered in drilling oil and other deep wells, and refers particularly to methods and apparatus employed when such wells are drilled by the rotary method.

In the rotary method of drilling wells, the well is kept filled with a mud-laden fluid. This mud-laden fluid is employed for the purpose of carrying away the detritus formed by the cutting bit and for maintaining a hydraulic pressure upon the sides of the hole, which prevents the hole from caving. In most wells drilled by the rotary process, it is impossible, without danger to the hole, to remove the mud-laden fluid without providing some other support to conserve the hole bore. The hydraulic pressure of the mud-laden fluid in the well is very great, being often in excess of two thousand pounds per square inch. In most instances, this pressure is in excess of the head upon the cognate fluids, either oil, water or gas, encountered in the formations penetrated by the drill. Under these circumstances, while drilling there may be no indication whatever at the surface of the well of the productivity or even existence of such cognate fluids. It is therefore necessary to perform a special testing operation whenever it is desired to determine whether such a formation contains a fluid which upon removal of the pressure of the mud-laden fluid will enter the well bore.

Under the present practice, when making such a test, it is necessary to remove the mud-laden fluid from the well bore until the hydraulic head of liquid within the well is sufficiently below the head of the cognate fluids in the formation in order to allow this latter fluid to enter the well bore. In order that this mud-laden fluid may be removed from the well bore without danger of the well caving in, it is the general practice to set a string or strings of casing in the well so that this string or strings of casing may support the wall of the well when the mud-laden fluid is withdrawn. The lower portion of at least the inside string of casing is perforated in order that the fluids from the formation may enter the casing after the removal of the mud-laden fluid. If a water sand has been encountered above the formation to be tested, it is necessary to run in a string of casing and cement or otherwise seal its bottom to the sides of the well bore at a point below the known water level, in order to protect the formation being tested from this upper water strata. This string of casing is then known as a water string. In testing a well, the hole below the bottom of this water string is then protected by another string set inside the water string.

In case the test develops that the formation tested is barren or not commercially productive or contains water and it is therefore desired to deepen the hole, it is necessary to refill the hole with mud-laden fluid, to remove if possible the inner perforated string, and to resume drilling. The cemented water string, however, must be left in the hole, which not only entails the cost of this string but decreases the size of the hole which can be thereafter drilled. If the testing operation is repeated with the setting of successive water strings, the size of the hole may ultimately become too small for successful drilling operations and attempts to drill deeper must therefore be abandoned.

An object of the present invention is to provide a method and apparatus for testing formations which is cheaper, quicker and more effective than the methods now in use. More particularly an object of the present invention is to provide a method and apparatus for testing the formations penetrated by a drill, which method and apparatus may be employed without the necessity of removing the mud-laden fluid from the well bore.

Another object of my invention is to provide a method and apparatus for testing formations being penetrated by a drill, which method and apparatus does not require the setting of a water string above the formation to be tested and thus permits the testing of a well without involving the cost of such water string.

Another object of my invention is to provide a method and apparatus for testing formations being pentrated by a drill, which method and apparatus does not entail decreasing the size of the well bore.

Another object of my invention is to provide a method and apparatus for obtaining a sample of the cognate fluid in the formation to be tested without substantial contamination of such sample.

In accordance with my invention, whenever it is desired to test the productivity of a formation in a well, I establish an empty chamber or conduit in the well bore adjacent the formation to be tested without removing the mud-laden fluid from the well, and then permit the cognate fluids of the formation to discharge into said empty chamber or conduit. In the preferred form of the invention, such empty chamber is established

extending from the formation tested to the top of the well, whereby, in certain cases when the cognate fluids of the formation are under sufficient pressure, the well may commence producing through this conduit. In other cases where cognate fluids of the formation are not under such high pressure, the conduit may be again shut off from communication with the formation after certain amount of the cognate fluids of the formation have entered the empty conduit or chamber. This closing of the conduit is effected by an operator at the top of the well who can open and close the conduit at will. Following the entrance of the cognate fluid into the empty conduit or chamber, the apparatus may be elevated to the top of the well with the entrapped fluid content. The conduit being closed, the mud-laden fluid in the well is prevented from entering the conduit and contaminating the sample or otherwise interfering with the testing process.

The present invention also preferably embodies a means by which the formation to be tested may be sealed off from the hydraulic pressure of the mud-laden fluid standing within the well during the testing operation, and also includes a method and means by which the hydraulic pressure of the mud-laden fluid in the well may be reimposed upon the formation after the completion of the testing operation without either of these steps requiring any removal of mud-laden fluid from the well bore.

The present invention also provides a method and apparatus by which a formation may be tested through the penetration of the lower end of the testing apparatus into a so-called "rat hole", or an extension of the well bore of reduced diameter, the bottom of the hole thus leaving the hole provided with a seat above the formation to be tested which may be employed for setting of water or other string of casing if the test on the well establishes the productivity of a formation.

Various further objects and advantages of the present invention will appear from a description of a preferred form or example of the present invention. For this purpose, reference is made to the accompanying drawing which illustrates an apparatus embodying the invention and which further illustrates one example of an apparatus which is suitable for use in carrying out the process embodying the present invention.

In the drawing, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side elevation of the device taken partly in section and with parts broken away,

Figure 2 is a partial perspective view of the device with the parts drawn out for clearness, and

Figure 3 is a top plan view of the complete device shown in Figure 1.

The example of the apparatus illustrated is shown as consisting mainly of the following principal elements: A casing 23 or other means and adapted to be operated when the device has been lowered into position within the well hole to permit the cognate fluids of the formation to discharge into the empty chamber or conduit provided by the pipe 23. The apparatus is also illustrated as preferably comprising a packer 15 or other means for sealing off the formation to be tested from the pressure of the head of mud-laden fluid within the well bore. The invention is also illustrated as comprising an inlet member 12 below the packer and valve, through which the fluids from the formation to be tested may be permitted to discharge into the conduit or chamber formed by the casing or pipe 23 when the valve is operated as later described.

Referring more particularly to the drawing, the body 4 preferably formed of a body of steel or other appropriate material traversed longitudinally by one or more passages 5 and 6 here shown to be two in number and disposed diametrically of the body 4, which in the instance illustrated is round in cross-section.

The body 4 is provided with pins 7 and 8 extending respectively upwardly and downwardly therefrom, these pins being turned from a block of material of which the body portion is a part, or being otherwise produced, and the upper pin 7 being smaller in diameter as compared with the diameter of the lower pin 8. The lower pin 8 is of greater diameter as it is also traversed by passages which are continuations of the passages 5 and 6 in the body part 4. These passages converge downwardly and they both communicate at their base with the interior of the hollow adjusting sleeve 9 which is internally threaded at both ends to engage with external threads 10 upon the lower end of the pin 8 and with similar external threads 11 upon the upper end of the inlet member 12. This inlet member 12 is indicated as preferably in the form of a hollow perforated pipe or strainer which, when the invention is employed to test a well through the employment of a so-called "rat-hole", is adapted to fit into the "rat hole" and support the sides of said "rat hole" when the pressure of the mud-laden fluid within the well is sealed off from said hole as hereafter described. This strainer is closed at its lower end by the plug 13 which may be removable and for this purpose it is provided with screw threads indicated at 14, for taking into complemental threads upon the lower end of the strainer. The pin 8 is also of greater diameter in order to better receive the packer member 15. The packing member 15 is indicated as being of frusto-conical shape so that it is adapted to wedge within the upper end of the "rat hole" within the well bore and thus seal the formation below from the pressure of the mud-laden fluid within the well. For this purpose, the packer member 15 may, for example, be composed of rubber, lead or other appropriate material. The wider part of this packer member is disposed upwardly and the lower smaller end ... end of the adjust-

chamber. This closing of the conduit is effected by an operator at the top of the well who can open and close the conduit at will. Following the entrance of the cognate fluid into the empty conduit of chamber, the apparatus may be elevated to the top of the well with the entrapped fluid content. The conduit being closed, the mud-laden fluid in the well is prevented from entering the conduit and contaminating the sample or otherwise interfering with the testing process.

The present invention also preferably embodies a means by which the formation to be tested may be sealed off from the hydraulic pressure of the mud-laden fluid standing within the well during the testing operation, and also includes a method and means by which the hydraulic pressure of the mud-laden fluid in the well may be reimposed upon the formation after the completion of the testing operation without either of these steps requiring any removal of mud-laden fluid from the well bore.

The present invention also provides a method and apparatus by which a formation may be tested through the penetration of the lower end of the testing apparatus into a so-called "rat hole", or an extension of the well bore of reduced diameter, the bottom of the hole thus leaving the hole provided with a seat above the formation to be tested which may be employed for setting of water or other string of casing if the test on the well establishes the productivity of a formation.

Various further objects and advantages of the present invention will appear from a description of a preferred form or example of the present invention. For this purpose, reference is made to the accompanying drawing which illustrates an apparatus embodying the invention and which further illustrates one example of an apparatus which is suitable for use in carrying out the process embodying the present invention.

In the drawing, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side elevation of the device taken partly in section and with parts broken away,

Figure 2 is a partial perspective view of the device with the parts drawn out for clearness, and

Figure 3 is a top plan view of the complete device shown in Figure 1.

The example of the apparatus illustrated is shown as consisting mainly of the following principal elements: A casing 23 or other means adapted to provide an empty chamber or conduit which may be lowered into a well bore and, when so lowered, provide an empty chamber adjacent the formation to be tested. In the preferred form of the invention where this member comprises a casing 23, there will thus be provided an empty chamber or conduit extending from the formation to be tested up to the top of the well hole. The invention also comprises as the second major element a valve including the valve body 4 and head or bushing 19, which is adapted to normally close such chamber or conduit 23 from communication with the mud-laden fluid within the well 12 below the packer and valve, through which the fluids from the formation to be tested may be permitted to discharge into the conduit or chamber formed by the casing or pipe 23 when the valve is operated as later described.

Referring more particularly to the drawing, the body 4 preferably formed of a body of steel or other appropriate material traversed longitudinally by one or more passages 5 and 6 here shown to be two in number and disposed diametrically of the body 4, which in the instance illustrated is round in cross-section.

The body 4 is provided with pins 7 and 8 extending respectively upwardly and downwardly therefrom, these pins being turned from a block of material of which the body portion is a part, or being otherwise produced, and the upper pin 7 being smaller in diameter as compared with the diameter of the lower pin 8. The lower pin 8 is of greater diameter as it is also traversed by passages which are continuations of the passages 5 and 6 in the body part 4. These passages converge downwardly and they both communicate at their base with the interior of the hollow adjusting sleeve 9 which is internally threaded at both ends to engage with external threads 10 upon the lower end of the pin 8 and with similar external threads 11 upon the upper end of the inlet member 12. This inlet member 12 is indicated as preferably in the form of a hollow perforated pipe or strainer which, when the invention is employed to test a well through the employment of a so-called "rat-hole", is adapted to fit into the "rat hole" and support the sides of said "rat hole" when the pressure of the mud-laden fluid within the well is sealed off from said hole as hereafter described. This strainer is closed at its lower end by the plug 13 which may be removable and for this purpose it is provided with screw threads indicated at 14, for taking into complemental threads upon the lower end of the strainer. The pin 8 is also of greater diameter in order to better receive the packer member 15. The packing member 15 is indicated as being of frusto-conical shape so that it is adapted to wedge within the upper end of the "rat hole" within the well bore and thus seal the formation below from the pressure of the mud-laden fluid within the well. For this purpose, the packer member 15 may, for example, be composed of rubber, lead or other appropriate material. The wider part of this packer member is disposed upwardly and the lower smaller end is disposed against the upper end of the adjusting sleeve 9 which forms an abutment for the packer member. The upper wide end of the packer member 15 fits against a shoulder 16 at the lower end of the body member 4. This shoulder is beveled or under-cut with its outer edge depending below its inner circular edge. This permits the upper end of the packer member 15 to be forced into the recess thus formed in the shoulder 16 when pressure is put upon the packer member 15 and the effect is to hold the packer member more firmly and to give it a stronger backing and abutment to enable the

packer member to be squeezed into the rat-hole and form a tight fit.

The upper divergent ends of the passages 5 and 6 open at opposite sides of the narrow upper pin 7 and these passages are adapted to register with similar passages 17 and 18 extending lengthwise through the head or bushing 19 of the valve which head is rotatably mounted upon the pin 7 and is secured thereto as by the lock nuts 20 and 21 screwed upon the upper externally threaded end of the pin 7 which is made of a length to project above the upper end of the bushing 19. This bushing 19 is also preferably cylindrical or substantially in the form of a barrel and is provided with external threads 22 upon its upper end for receiving the pipe or casing 23 indicated in dotted lines in Figure 1. The passages 17 and 18 open out upon the upper end of the bushing 19 and communicate with the interior of the casing 23.

The lower end of the bushing 19 is provided with a slot 24 to receive the pin 25 provided with the threaded shank which is secured in a threaded opening in the upper end of the body member 4.

It will be seen from the foregoing description that I have provided a valve at the end of the casing 23 which can be manipulated as desired from the surface of the well to close or open the empty chamber or conduit provided by the pipe or casing 23. The slot 24 and pin 25 between the head 19 and body 4 of the valve provides a means by which the relative rotation between the head and body of the valve may be limited in order to facilitate registering the passages in the head with those in the body of the valve.

In the use of the preferred apparatus of the invention and in practicing the preferred method of testing formations through use of said apparatus, the device is let down through the well but before so doing care should be taken to close the valve by rotating the bushing 19 to such position that the passages 17 and 18 thereof are out of registry with the complemental passages 5 and 6 in the body member 4 and lower pin 8. In this condition of the parts any fluid that may be standing in the well will be prevented from entering the casing 23, as, of course, the entry of such fluid would interfere with the purity of the sample sought.

In this manner there is thus established an empty chamber or conduit adjacent the formation to be tested, without the necessity of removing the mud-laden fluid from the well hole. It should be pointed out that the entrance of the mud-laden fluid into the empty chamber or conduit of the pipe or casing 23 should be prevented during the lowering of the apparatus in the well in order to prevent the pressure of the mud-laden fluid from filling up this empty chamber or conduit, whereby it would impose its hydraulic head upon the formation to be tested when the valve is opened and thus defeat the object of the testing method.

The packer 15 is lowered into the small hole at the bottom of the well which is called the rat-hole, and it is forced into this small hole, compressing the [illegible]

brought into alignment and when this condition occurs, the fluid in the rat-hole will enter the strainer pipe 12 and ascend through the passages in the pin 8, body member 4 and bushing 19 into the casing 23. It will be obvious that if the pressure of the cognate fluids within the formation is sufficiently high that production may then take place through the casing 23. When the pressure is not sufficient for this purpose and when a sample of sufficient mass has been received the bushing 19 is again rotated in the opposite direction in order to move the passages out of registry and trap the sample in pipe 23. The entire device may be then lifted to the surface and the possible production may be measured from the sand tested.

The strainer pipe 12 may or may not be used and the valve and packer as constructed may be connected in the same manner as a bit to the drill stem and run into the hole in the same manner, making it possible within a very few minutes to gain the sample and to pull it to the surface.

It will be apparent that the packer 25 operates to remove the pressure of the mud-laden fluid in the well from the cognate fluids of the formation, which are then free to discharge into the empty conduit formed by the casing 23 whenever the valve is opened to permit communication between the formation and this empty conduit. It will be further seen that as soon as the valve is closed and the testing apparatus started to be removed from the formation, thus releasing the packer, the pressure of this mud-laden fluid is again immediately reimposed upon the formation, thus preventing further discharge of the fluids of such formation. In this manner the well is always under control and no danger of blow-outs encountered. Moreover, the conduit being positively closed, during the withdrawal of the apparatus, the mud-laden fluid within the well cannot contaminate the sample or otherwise interfere with the testing operation.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of the apparatus of this invention without departing from the spirit thereof, and the particular embodiment of the method of the present invention is not limited nor dependent upon the use of the particular apparatus described nor is it limited to the particular details of the preferred method, but both method and apparatus of the present invention include all such changes, modifications, substitutions and equivalents as come within the scope of the following appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. A well testing device comprising a body part having passages therethrough open at the bottom to receive a sample of the material to be tested, a packer member carried by said body part, and a bushing carried by the casing and rotatable with respect to said body part having passages therein [illegible] the body

bushing 19 is also preferably cylindrical or substantially in the form of a barrel and is provided with external threads 22 upon its upper end for receiving the pipe or casing 23 indicated in dotted lines in Figure 1. The passages 17 and 18 open out upon the upper end of the bushing 19 and communicate with the interior of the casing 23.

The lower end of the bushing 19 is provided with a slot 24 to receive the pin 25 provided with the threaded shank which is secured in a threaded opening in the upper end of the body member 4.

It will be seen from the foregoing description that I have provided a valve at the end of the casing 23 which can be manipulated as desired from the surface of the well to close or open the empty chamber or conduit provided by the pipe or casing 23. The slot 24 and pin 25 between the head 19 and body 4 of the valve provides a means by which the relative rotation between the head and body of the valve may be limited in order to facilitate registering the passages in the head with those in the body of the valve.

In the use of the preferred apparatus of the invention and in practicing the preferred method of testing formations through use of said apparatus, the device is let down through the well but before so doing care should be taken to close the valve by rotating the bushing 19 to such position that the passages 17 and 18 thereof are out of registry with the complemental passages 5 and 6 in the body member 4 and lower pin 8. In this condition of the parts any fluid that may be standing in the well will be prevented from entering the casing 23, as, of course, the entry of such fluid would interfere with the purity of the sample sought.

In this manner there is thus established an empty chamber or conduit adjacent the formation to be tested, without the necessity of removing the mud-laden fluid from the well hole. It should be pointed out that the entrance of the mud-laden fluid into the empty chamber or conduit of the pipe or casing 23 should be prevented during the lowering of the apparatus in the well in order to prevent the pressure of the mud-laden fluid from filling up this empty chamber or conduit, whereby it would impose its hydraulic head upon the formation to be tested when the valve is opened and thus defeat the object of the testing method.

The packer 15 is lowered into the small hole at the bottom of the well which is called the rat-hole, and it is forced into this small hole, compressing the packer and thereby excluding all water from the well above. This squeezing or forcing of the packer 15 into the rat-hole also anchors the body against rotary or turning movement. Therefore, the pipe or casing 23 may be rotated to cause similar rotation of the bushing 19 to effect registry of the passages 17 and 18 with the passages 5 and 6. The striking of the pin 25 against the other wall of the slot 24 will indicate to the operator when the passages have been trap the sample in pipe 23. The entire device may be then lifted to the surface and the possible production may be measured from the sand tested.

The strainer pipe 12 may or may not be used and the valve and packer as constructed may be connected in the same manner as a bit to the drill stem and run into the hole in the same manner, making it possible within a very few minutes to gain the sample and to pull it to the surface.

It will be apparent that the packer 25 operates to remove the pressure of the mud-laden fluid in the well from the cognate fluids of the formation, which are then free to discharge into the empty conduit formed by the casing 23 whenever the valve is opened to permit communication between the formation and this empty conduit. It will be further seen that as soon as the valve is closed and the testing apparatus started to be removed from the formation, thus releasing the packer, the pressure of this mud-laden fluid is again immediately reimposed upon the formation, thus preventing further discharge of the fluids of such formation. In this manner the well is always under control and no danger of blow-outs encountered. Moreover, the conduit being positively closed, during the withdrawal of the apparatus, the mud-laden fluid within the well cannot contaminate the sample or otherwise interfere with the testing operation.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of the apparatus of this invention without departing from the spirit thereof, and the particular embodiment of the method of the present invention is not limited nor dependent upon the use of the particular apparatus described nor is it limited to the particular details of the preferred method, but both method and apparatus of the present invention include all such changes, modifications, substitutions and equivalents as come within the scope of the following appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. A well testing device comprising a body part having passages therethrough open at the bottom to receive a sample of the material to be tested, a packer member carried by said body part, and a bushing carried by the casing and rotatable with respect to said body part having passages therein adapted to register with the passages in the body part to receive the sample to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same.

2. A well testing device comprising a body part having a passage therein open at its bottom to receive the material to be tested, a packer adjoining said body part, a bushing having a passage adapted to register with the passage in the body part and connected for manipulation to the cas-

ing, and means to restrict the rotary movement of said bushing, said passages being constructed to receive the material to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same.

3. A well testing device comprising a body part having a passage extending therethrough and opening at the ends thereof, a packer associated with said body part, a pin extending upwardly from said body part, a bushing rotating on said pin and having a passage therein extending from end to end and adapted to register with the passage in said body part, said bushing having means to receive a casing in communication with the passage in the bushing, and means to confine said bushing on the pin, said passages being constructed to receive the material to be tested.

4. A well testing device comprising a body part having pins extending from the upper and lower ends thereof, the lower pin being of greater diameter than the upper, said body part and lower pin having a continuous passage therein open at its upper and lower ends, a packer extending about the lower pin, and a bushing mounted for rotation on the upper pin being connected to a string of casing and having a passage therein adapted to be moved into and out of registry with the passage in said body part and lower pin.

5. A well testing device comprising a body part having an upper pin, a bushing fitted to rotate about said upper pin and having a slot at its lower end with threads at its upper end to receive a casing, said pin projecting upwardly above the bushing and having means to hold the bushing on the pin, a stop member carried by said body part and projecting in the slot at the lower end of the bushing, said body part having a passage therein, said body part and bushing having passages adapted to register, and a casing carried by said body part.

6. A well testing device comprising a body part having a lower pin projecting therefrom and forming a shoulder with the body part, said shoulder being under-cut, a downwardly tapering packer surrounding said pin for engaging against said under-cut shoulder, and means at the lower end of said pin for constituting an abutment for said packer, said body part and pin having a passage therethrough, and means adjoining the upper end of said body part for opening and closing the communication of this passage with the casing above.

7. A well testing device comprising a body part having a pin extending from the lower part thereof, said body part and pin having a passage therethrough, a packer extending about said pin, an adjusting sleeve on the lower end of said pin, a perforated pipe secured to the lower end of said sleeve, a plug in the bottom of said perforated pipe, and means above the body part for regulating the communication of the passage with the interior of the casing above.

8. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid raising the pipe so closed to remove an entrapped sample and the packer from the well.

9. Apparatus for testing a well comprising a string of pipe to be lowered into a well having an inlet at its lower end and carrying a packer adapted to be positively pressed against the walls of the formation to seal off the same above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

10. Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer carried by the pipe said packer adapted to be positively pressed against the walls of the formation to seal off the same and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

11. Apparatus for testing a well containing drilling fluid, which includes an empty string of pipe to be lowered in the well to adjacent the formation to be tested, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve for controlling the inlet, and means carried by the pipe for sealing the well above the inlet said means consisting of a packer adapted to be positively pressed against the walls of the formation to seal off the same, the valve being positively controlled by movement of the pipe.

12. Apparatus for testing a formation encountered in a well containing drilling fluid, which includes a single string of pipe to be lowered into the well to adjacent the formation to be tested, a valved inlet at the lower end of the pipe positively controlled from the top of the well by movement of the pipe and a packer carried by the pipe above the inlet, said packer being adapted to be positively pressed against the walls of the formation to seal off the same.

13. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes an empty string of pipe to be lowered into the well to adjacent the formation to be tested, a packer carried by the pipe adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

14. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said sealing means being adapted to

end to end and adapted to register with the passage in said body part, said bushing having means to receive a casing in communication with the passage in the bushing, and means to confine said bushing on the pin, said passages being constructed to receive the material to be tested.

4. A well testing device comprising a body part having pins extending from the upper and lower ends thereof, the lower pin being of greater diameter than the upper, said body part and lower pin having a continuous passage therein open at its upper and lower ends, a packer extending about the lower pin, and a bushing mounted for rotation on the upper pin being connected to a string of casing and having a passage therein adapted to be moved into and out of registry with the passage in said body part and lower pin.

5. A well testing device comprising a body part having an upper pin, a bushing fitted to rotate about said upper pin and having a slot at its lower end with threads at its upper end to receive a casing, said pin projecting upwardly above the bushing and having means to hold the bushing on the pin, a stop member carried by said body part and projecting in the slot at the lower end of the bushing, said body part having a passage therein, said body part and bushing having passages adapted to register, and a casing carried by said body part.

6. A well testing device comprising a body part having a lower pin projecting therefrom and forming a shoulder with the body part, said shoulder being under-cut, a downwardly tapering packer surrounding said pin for engaging against said under-cut shoulder, and means at the lower end of said pin for constituting an abutment for said packer, said body part and pin having a passage therethrough, and means adjoining the upper end of said body part for opening and closing the communication of this passage with the casing above.

7. A well testing device comprising a body part having a pin extending from the lower part thereof, said body part and pin having a passage therethrough, a packer extending about said pin, an adjusting sleeve on the lower end of said pin, a perforated pipe secured to the lower end of said sleeve, a plug in the bottom of said perforated pipe, and means above the body part for regulating the communication of the passage with the interior of the casing above.

8. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe, string of pipe to be lowered into the well, a packer carried by the pipe said packer adapted to be positively pressed against the walls of the formation to seal off the same and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

11. Apparatus for testing a well containing drilling fluid, which includes an empty string of pipe to be lowered in the well to adjacent the formation to be tested, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve for controlling the inlet, and means carried by the pipe for sealing the well above the inlet said means consisting of a packer adapted to be positively pressed against the walls of the formation to seal off the same, the valve being positively controlled by movement of the pipe.

12. Apparatus for testing a formation encountered in a well containing drilling fluid, which includes a single string of pipe to be lowered into the well to adjacent the formation to be tested, a valved inlet at the lower end of the pipe positively controlled from the top of the well by movement of the pipe and a packer carried by the pipe above the inlet, said packer being adapted to be positively pressed against the walls of the formation to seal off the same.

13. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes an empty string of pipe to be lowered into the well to adjacent the formation to be tested, a packer carried by the pipe adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

14. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said sealing means being adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

15. Apparatus for testing the productivity of a formation encountered in a well containing

drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

16. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer carried by the pipe for sealing off the well above the formation an inlet below the packer opening into the pipe, said packer adapted to be positively pressed against the walls of the formation to seal off the same, and a valve for the inlet, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

17. Apparatus for testing a well containing drilling fluid, comprising a single string of pipe to be lowered into the well through the drilling fluid, said pipe being closed against the entrance of the drilling fluid, means at the lower end of the pipe for receiving a sample including an inlet opening into the pipe, means carried by the pipe for sealing the well above the inlet, said sealing means adapted to be positively pressed against the walls of the formation to seal off the same, and a valve for the inlet that may be positively opened and closed by movement of the pipe while the well is sealed above the inlet.

18. A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognant fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample.

19. An apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove the entrapped sample, said pipe being closed against the flow of the drilling fluid as the pipe is lowered into the well, a packer carried by the pipe as the pipe is lowered into the well and adapted to be seated by manipulation of the pipe to seal off the well above the formation, said packer adapted to be positively pressed against the walls of the formation to seal off the same, an inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well.

JOHN T. SIMMONS.

[PLAINTIFF'S EXHIBIT No. 2.]

390

DEPARTMENT OF COMMERCE
United States Patent Office

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of the File Wrapper and Contents, in the matter of the

Letters Patent of
John T. Simmons, Assignor, by
Direct and Mesne Assignments, to
Erle P. Halliburton,

Number 1,930,987, Granted October 17, 1933,

for

Improvement in Methods and Apparatus for Testing the Productivity of Formations Encountered in Wells.

[Seal] In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this thirtieth day of October, in the year of our Lord one thousand nine hundred and thirty-five and of the Independence of the United States of America the one hundred and sixtieth.

Attest:

D E Wilson
Chief of Division.

Conway P. Coe
Commissioner of Patents.

1930987

NUMBER (Series of 1925) PATENT NO.
87323 1926 DATED OCT 17 1933
DIV. 38 EX'R'S BOOK) 109

9

Name JOHN T. SIMMONS
by direct and mesne assigts
Assn to ~~2 to Frank N. Henderson, of El Dorado, Arkansas.~~ Erle P. Halliburton, ~~of~~ Los Angeles, California

~~of~~ EL DORADO,
State of ARK.~~ANSAS~~
Invention Method and Apparatus for Testing the Productivity of Formations Encountered in Wells
~~WELL TESTING DEVICES~~

ORIGINAL
APPLICATION FILED COMPLETE FEB 10, 1926

Parts of Application Filed

Petition, Specification, Oath, First Fee $20, XXXXXXXXXXXX — FEB 9, 1926
I SHEET DRAWING FEB 10, 1926

Examined and passed for Issue Sept 13, 1933
C. F. Krafft Exr. Div. 38

Notice of Allowance SEP 13 1933 , 192
By Commissioner.

Final Fee $30 Sept 19, 1933

RENEWED

....

....

....

....

Reexam'd and passed for Issue ...., 192

.... Exr. Div. ....

Notice of Allowance ...., 192

By Commissioner.

Final Fee ...., 192

Attorney ~~WILKINSON & GIUSTA OURAY BLDG CITY~~

708
Lyon and Lyon ^ National City Bank Building, Los Angeles, Calif.

Associate Attorney ~~J. M. Mason McGill Bldg, City~~
Mason & Mason, ~~Work. Loan & Trust Bldg.,~~
Metropolitan Bank Bldg.,
Washington D. C.

No. of Claims Allowed 19 Print Claims ....in O. G. Class 166 - 1

Title as Allowed Method and Apparatus for Testing the Productivity of Formations Encountered in Wells

....

....

[In margin]: Division of App., No. ....
filed ...., 19........

Serial No. 10787 Paper No. 1
Application
87323

PETITION

[Written]: 20 H

[Stamped]: $............ REC'D FEB 9 1926 C. C. U. S. PAT. OFFICE

To the Commissioner of Patents:

Your petitioner John T. Simmons, a citizen of the United States residing at El Dorado, in the County of Union, and State of Arkansas, whose post-office address is P. O. Box 1411, El Dorado, Arkansas, prays that Letters-Patent may be granted to him for the improvements in

WELL TESTING DEVICES

as set forth in the annexed specification.

And he hereby appoints the firm of WILKINSON & GIUSTA, of Washington, D. C., and Denver, Colorado, composed of Ernest Wilkinson and John Stephen Giusta, Registration No. 238, his attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign the drawings, to receive the Patent, and to transact all business in the Patent Office connected therewith.

☞ Each Inventor's FULL name here

John T. Simmons

OATH

tate of Arkansas }
ounty of Pulaski } ss:

John T. Simmons, the above-named petitioner...., being ily sworn (affirmed), deposes and says that he is a cit-en.... of the United States and resident.... of El Dorado, rkansas and that he verily believes himself to be the iginal, first and sole inventor of the improvement in ELL TESTING DEVICES described and claimed in e annexed specification; that he does not know and es not believe that the same was ever known or used fore his invention or discovery thereof; or patented or scribed in any printed publication in any country be-re his invention or discovery thereof, or more than o years prior to this application; or patented in any untry foreign to the United States on an application d more than twelve months before this application; in public use or on sale in the United States for more n two years prior to this application; and that (no) plication for patent on said improvement has been d by him or his representatives or assigns in any ntry foreign to the United States..............................

....

☞ Each Inventor's FULL name here

John T. Simmons

....

worn to and subscribed before me at El Dorado, Ar-sas, this 2nd day of February, 1926

Seal] Jos. H. Schneider

(Signature of Notary Public)

ere must be an OFFICIAL SEAL here]

ritten]: Exp 6/1/29

87 1

~~SPECIFICATION.~~

[Written in margin]: Per A " '

~~TO ALL WHOM IT MAY CONCERN:~~

~~Be it known that I, John T. Simmons, a citizen of the United States, residing at El Dorado, in the County of Union, and State of Arkansas, have invented certain new and useful improvements in~~

the Productivity of Formations
Method and Apparatus for Encountered in Wells
~~WELL~~ TESTING ~~DEVICES~~

~~and I do hereby declare the following to be a full, clear and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.~~

87 2

[Written]: Insert A 1 4 pp

[Written in margin]: Sub. A 1

~~The present invention relates to improvements in well esting devices and has for an object to provide an im-~~

~~gr (1) point (1)~~

~~roved device known as a "rat hole test packer" useful or securing samples of the gas and oil at various strata n the well being drilled.~~

~~The device will be found useful for both oil and gas vells and will correctly indicate the nature of the field efore setting a permanent string of casing.~~

~~A further object of the invention is to provide an in-xpensive, simple and compact device which may be con-eniently and quickly lowered into the well and through~~

~~gr 1 pt 2~~

~~e rat hole opening, which will (exclude the entrance f fluid from the well) as it is being passed down-ardly, which may be readily manipulated to permit e entrance of the oil, gas and fluid to be tested and hich will effectually retain this sample during the rawing of the device again to the surface.~~

87 3

[In margin]: Hws ~~(InsA 1)~~ ~~(4¼pp)~~

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side elevation of the device taken partly in section and with parts broken away,

Figure 2 is a partial perspective view of the device with the parts drawn out for clearness, and

Figure 3 is a top plan view of the complete device shown in Figure 1.

[Written]: (26)

A 2

[In margin]: A 2

[In margin]: Per A " "

the body

Referring more particularly to the drawings, ^ preferably formed of

4 ^ ~~designates~~ a body of steel or other appropriate material traversed longitudinally by one or more passages 5 and 6 here shown to be two in number and disposed diametrically of the body 4, which in the instance illustrated is round in cross-section.

The body 4 is provided with pins 7 and 8 extending respectively upwardly and downwardly therefrom, these pins being turned from a block of material of which the body portion is a part, or being otherwise produced, and the upper pin 7 being smaller in diameter as compared with the diameter of the lower pin 8. The lower pin 8 is

87 4

f greater diameter as it is also traversed by passages hich are continuations of the passages 5 and 6 in the ody part 4. These passages converge downwardly and ey both communicate at their base with the interior of e hollow adjusting sleeve 9 which is internally threaded both ends, to engage with external threads 10 upon the wer end of the pin 8 and with similar external threads 11

[In margin]: Insert A 3

(2)

on the upper end of the ∧ hollow perforated pipe or
A 3

[In margin]: Insert A 4

rainer ~~12~~ ∧ . This strainer ~~12~~ is closed at its lower end
A 4

the plug 13 which may be removable and for this purpose it is provided with screw threads indicated at 14, r taking into complemental threads upon the lower end the strainer. The pin 8 is also of greater diameter

[In margin]: Insert A 5

in order to better receive the ~~frusto conical~~ packer mem-
(6)
ber 15, ^ of rubber, lead or other appropriate material.
A 5

The wider part of this packer member is disposed up-
the
wardly and / lower smaller end is disposed against the upper end of the adjusting sleeve 9 which forms an abutment for the packer member. The upper wide end of the packer member 15 fits against a shoulder 16 at the lower end of the body member 4. This shoulder is beveled or under-cut with its outer edge depending below its inner circular edge. This permits the upper end of the packer member 15 to be forced into the recess thus formed in the shoulder 16 when pressure is put upon the packer member 15 and the effect is to hold the packer member more firmly and to give it a stronger backing and abutment to enable the packer member to be squeezed into the rathole and form a tight fit.

(X)

87 5

[In margin]: Per A " "

The upper divergent ends of the passages 5 and 6 open
at opposite sides of the narrow upper pin 7 and these
passages are adapted to register with similar pas-
The head or
ages 17 and 18 extending lengthwise through ~~a~~ ^
of the valve head
bushing 19 ^ which ^ is rotably mounted upon the pin
7 and is secured thereto as by the lock nuts 20 and 21
screwed upon the upper externally threaded end of the
pin 7 which is made of a length to project above the
upper end of the bushing 19. This bushing 19 is also
preferably cylindrical or substantially in the form of a
barrel and is provided with external threads 22 upon its
upper end for receiving the pipe or casing 23 indicated
in dotted lines in Figure 1. The passages 17 and 18
open out upon the upper end of the bushing 19 and com-
municate with the interior of the casing 23.

The lower end of the bushing 19 is provided with a slot
the
24 to receive the pin 25 provided with / threaded shank
which is secured in a threaded opening in the upper end
of the body member 4.

[Written]: (10) A 6—

[In margin]: Insert A 6 Insert A 7 Per A
preferred apparatus of the (2)

In the use of the ^ invention ^, the device is ~~at-~~
A 7
~~tached to a string of casing of which 23 is a part and~~

9

Serial No. 87.323 Paper No. 3

Amendment A and Affidavit.

[Stamped]: U. S. Patent Office MAR 25 1926 DIVISION 38

[Written]: Brg new

[Stamped]: APPLICATION DIV. MAR 24 1926 U. S. PATENT OFFICE

10790

IN THE UNITED STATES PATENT OFFICE

Re application of
John T. Simmons,
WELL TESTING DEVICES,
Ser. No. 87323,
Filed Feb. 10, 1926.

- - - - - - - -

Los Angeles, Calif.
March 9th, 1926.

Commissioner of Patents,
Washington, D. C.

Sir:–

Kindly amend the above entitled application as follows:

In the preamble and Petition, change the title from "WELL TESTING DEVICES to—METHOD AND

PARATUS FOR TESTING THE PRODUCTIV-
Y OF FORMATIONS ENCOUNTERED IN
ELLS—.

Cancel Page 2 of the specification and substitute there-
the following:–

Written]: Hws

In margin]: (A 1)

The present invention relates to methcds and appara-
for testing the productivity of formations encountered
rilling oil and other deep wells, and refers particularly
nethods and apparatus employed when such wells are
led by the rotary method.

the rotary method of drilling wells, the well is kept
l with a mud-laden fluid. This mud-laden fluid is em-
ed for the purpose of carrying away the detritus
ned by the cutting bit and for maintaining a hydraulic
sure upon the sides of the hole, which prevents the
from caving. In most wells drilled by the rotary
ess, it is impossible, without danger to the hole, to
ve the mud-laden fluid without providing some other
ort to conserve the hole bore.

87 13

let down through the well / but before so doing care

[In margin]: " "

close the valve by rotating

should be taken to ^ ~~rotate~~ the bushing 19 to such position that the passages 17 and 18 thereof are out of registry with the complemental passages 5 and 6 in the body member 4 and lower pin 8. In this condition of the parts any fluid that may be standing in the well will be prevented from entering the casing 23, as, of course, the entry of such fluid would interfere with the purity of the sample sought.

87 6

-5-

10799

[In margin]: Insert A 8

(11) A 8—

The packer 15 is lowered into the small hole at the bottom of the well which is called the rat-hole, and it is forced into this small hole, compressing the packer and thereby excluding all water from the well above. This squeezing or forcing of the packer 15 into the rat-hole also anchors the body against rotary or turning movement. Therefore, the pipe or casing 23 may be rotated to cause similar rotation of the bushing 19 to effect registry of the passages 17 and 18 with the passages 5 and 6. The striking of the pin 25 against the other wall of the slot 24 will indicate to the operator when the pas-

es have been brought into alignment and when this
dition occurs, the fluid in the rat-hole will enter the
iner pipe 12 and ascend through the passages in the
8, body member 4 and bushing 19 into the casing

In margin]: Insert A 9 JK JK. 15

When

^ ~~When~~ a sample of sufficient mass has been re-
A 9

ed the bushing 19 is again rotated in the opposite
ction in order to move the passages out of registry
trap the sample in pipe 23. The entire device may
hen lifted to the surface and the possible production
be measured from the sand tested.

In margin]: Per A " "

valve and packer

he strainer pipe 12 may or may not be used and the ^
ee as constructed may be connected in the same man-

to the drill stem

as a bit ^ and run ~~promptly~~ into the hole in the same
ner, making it possible within a very few minutes
ain the sample and to pull it to the surface.

n margin]: Insert A 10

7)—A 10—

is obvious that various changes and modifications
be made in the details of construction and design

of the apparatus

e above specifically described embodiment ^ of this

n margin]: Sub. A 11 (8)

ition without departing from the spirit thereof, ~~such~~

87 7

[In margin]:

The hydraulic pressure of the mud-laden fluid in the well is very great, being often in excess of two thousand pounds per square inch. In most instances, this pressure is in excess of the head upon the cognate fluids, either oil, water or gas, encountered in the formations penetrated by the drill. Under these circumstances, while drilling there may be no indication whatever at the surface of the well of the productivity or even existence of such cognate fluids. It is therefore necessary to perform a special testing operation whenever it is desired to determine whether such a formation contains a fluid which upon removal of the pressure of the mud-laden fluid will enter the well bore.

[In margin]: (A 1 Contd)

Under the present practice, when making such a test, it is necessary to remove the mud-laden fluid from the well bore until the hydraulic head of liquid within the well is sufficiently below the head of the cognate fluids in the formation in order to allow this latter fluid to enter the well bore. In order that this mud-laden fluid may be removed from the well bore without danger of the well caving in, it is the general practice to set a string or strings of casing in the well so that this string or strings of casing may support the walls of the well when the mud-laden fluid is withdrawn. The lower portion of at least the inside string of casing is perforated in order that the fluids from the formation may enter the casing after the removal of the mud-laden fluid. If a water sand has been encountered above the formation to be tested, it is necessary to run in a string of casing and cement or otherwise seal its bottom to the sides of the well bore at a point below the known water level, in order to protect the formation

tested from this upper water strata. This string
sing is then known as a water string. In testing a
the hole below the bottom of this water string is
protected by another string set inside the water
.

margin]: (A 1 Contd)

case the test develops that the formation tested is
ı or not commercially productive or contains water
is therefore desired to deepen the hole, it is neces-
o refill the hole with mud-laden fluid, to remove if
le the inner perforated string, and to resume drilling.
emented water string, however, must be left in the
which not only entails the cost of this string but
ses the size of the hole which can be thereafter
l. If the testing operation is repeated with the set-
f successive water strings, the size of the hole may
tely become too small for successful drilling opera-
and attempts to drill deeper must therefore be aban-
.

object of the present invention is to provide a method
pparatus for testing formations which is cheaper,
r and more effective than the methods now in use.
particularly an object of the present invention is to
le a method and apparatus for testing the formations
ated by a drill, which method and apparatus may
ployed without the necessity of removing the mud-
fluid from the well bore.

ther object of my invention is to provide a method
paratus for testing formations being penetrated by
, which method and apparatus does not require the
of a water string above the formation to be tested
us permits the testing of a well without involving
t of such water string.

[Written]: (X)
87 15

[In margin]: Per A

changes and modifications being restricted only by the scope of the following claims.

[In margin]: Here

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

87 8

-7-

[In margin]: hand leaded

1. A well testing device comprising a body part having passages therethrough open at the bottom to receive a sample of the material to be tested, a packer member carried by said body part, and a bushing carried by the casing and rotatable with respect to said body part having passages therein adapted to register with the passages in

[In margin]: Per C " E

to receive the sample to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same.

the body part ^.

2. A well testing device comprising a body part hav-
g a passage therein open at its bottom to receive the
aterial to be tested, a packer adjoining said body part,
bushing having a passage adapted to register with the
ssage in the body part and connected for manipulation
the casing, and means to restrict the rotary movement

[In margin]: Insert C 1

said bushing, (3)

C1

3. A well testing device comprising a body part hav-
g a passage extending therethrough and opening at the
ds thereof, a packer associated with said body part, a
n extending upwardly from said body part, a bush-
g rotating on said pin and having a passage therein
tending from end to end and adapted to register with
e passage in said body part, said bushing having means
receive a casing in communication with the passage
the bushing, and means to confine said bushing on

[In margin]: Per C ~~Insert C 1~~

said passages being constructed to receive the
material to be tested.

e pin, ^

~~C 1~~

4. A well testing device comprising a body part hav-
g pins extending from the upper and lower ends there-
the lower pin being of greater diameter than the
per, said body part and lower pin having a continuous

87 9

passage therein open at its upper and lower ends, a packer extending about the lower pin, and a bushing mounted for rotation on the upper pin being connected to a string of casing and having a passage therein adapted to be moved into and out of registry with the passage in said body part and lower pin.

5. A well testing device comprising a body part having an upper pin, a bushing fitted to rotate about said upper pin and having a slot at its lower end with threads at its upper end to receive a casing, said pin projecting upwardly above the bushing and having means to hold the bushing on the pin, a stop member carried by said body part and projecting in the slot at the lower end of the bushing, said body part having a passage therein, said body part and bushing having passages adapted to register, and a casing carried by said body part.

6. A well testing device comprising a body part having a lower pin projecting therefrom and forming a shoulder with the body part, (said shoulder being under-cut,) a downwardly tapering packer surrounding said pin for engaging against said under-cut shoulder, and means at the lower end of said pin for constituting an abutment for said packer, said body part and pin having a passage therethrough, and means adjoining the upper end of said body part for opening and closing the communication of this passage with the casing above.

7. A well testing device comprising a body part having a pin extending from the lower part thereof,

d body part and pin having a passage therethrough, a ker extending about said pin, an adjusting sleeve on lower end of said pin, a perforated pipe secured to lower end of said sleeve, a plug in the bottom of said forated pipe, and means above the body part for regting the communication of the passage with the inior of the casing above.

[In margin]: Add ~~A 12~~ C 2

[Written]: C 2 Cls 8-17

~~A 12~~
C 2

Written]: copied

(John T. Simmons
(Full Signature of Inventor.

87 11

Serial No. 87323 Paper No. 2

[Written]: Power of Att'y

[Stamped]: MAIL ROOM MAR 16 1926 U. S. PATENT OFFICE

[Written]: 987

10786

[Stamped]: U. S. Patent Office MAR 18 1926 DIVISION 38

El Dorado, Ark. Feby. 17th 1926.

Lyon & Lyon,
National City Bk. Bldg.,
Los Angeles, Calif.
Leonard S. Lyon
Frederick S. Lyon
Henry Richmond.

I hereby authorize above named firm as well as individuals to represent me before the United States Patent Office in my Application for United States Letters Patent, Serial No. 87323 Filed Feby. 10th, 1926, Title "Well Testing Devices".

The above firm has the authority to sign its name to any and all papers in connection with the above application and are authorized to receive the Patent when granted for me.

Signed this the 17th day of February, 1926.

John T. Simmons

ATE OF ARKANSAS)
)
)
UNTY OF UNION. . . .)

[In margin]: (R)

BE IT REMEMBERED, That on this day came before
, the undersigned, a Notary Public, within and for the
unty and State aforesaid duly commissioned and act-
John T. Simmons, to me well known as the signor of
above authority instrument, and stated that he had
cuted the same for the uses, purposes, and considera-
ns therein mentioned and set forth.

WITNESS, my hand and seal as such Notary Public
this the 17th day of February, 1926.

Seal] Edna Cheatham
Notary Public.

Commission Expires;
. 29th 1927.

87 12

****

Another object of my invention is to provide a method and apparatus for testing formations being penetrated by a drill, which method and apparatus does not entail decreasing the size of the well bore.

Another object of my invention is to provide a method and apparatus for obtaining a sample of the cognate fluid in the formation to be tested without substantial contamination of such sample.

[In margin]: (A-1 Contd)

In accordance with my invention, whenever it is desired to test the productivity of a formation in a well, I establish an empty chamber or conduit in the well bore adjacent the formation to be tested without removing the mud-laden fluid from the well, and then permit the cognate fluids of the formation to discharge into said empty chamber or conduit. In the preferred form of the invention,

[In margin]: JK s

such empty chamber is established extending from the formation tested to the top of the well, whereby, in certain cases when the cognate fluids of the formation are under sufficient pressure, the well may commence producing through this conduit. In other cases where cognate fluids of the formation are not under such high pressure, the conduit may be again shut off from communication with the formation after certain amount of the cognate fluids of the formation have entered the empty conduit or chamber. This closing of the conduit is effected by an operator at the top of the well who can open and close the

[In margin]: Per B Cognate

nduit at will. Following the entrance of the ~~conduit~~ ^

[In margin]: JK of

iid into the empty conduit ~~ot~~ chamber, the apparatus ay be ele·ated to the top of the well with the entrapped iid content. The conduit being closed, the mud-laden iid in the well is prevented from entering the conduit d contaminating the sample or otherwise interfering th the testing process.

87 16

-4-

10794

The present invention also preferably embodies a means which the formation to be tested may be sealed off m the hydraulic pressure of the mud-laden fluid stand- within the well during the testing operation, and also udes a method and means by which the hydraulic ssure of the mud-laden fluid in the well may be re- osed upon the formation after the completion of the ing operation without either of these steps requiring removal of mud-laden fluid from the well bore.

In margin]: (A 1 Contd)

he present invention also provides a method and ap- itus by which a formation may be tested through the

Page 4, line 8, before "hollow" insert— inlet member 12. This inlet member 12 is indicated as preferably in the form of a—.

[In margin]: (A 4) Copied

Same page, line 9, cancel the numeral "12", both occurrences, and substitute— which, when the invention is employed to test a well through the employment of a so-called "rat hole", is adapted to fit into the "rat hole" and support the sides of said "rat hole" when the pressure

87 18

-6-

10800

[In margin]: Copied (A 4 contd)

of the mud-laden fluid within the well is sealed off from said hole as hereafter described—.

Same page, line 13, cancel "frusto-conical" and place a period after the numeral "15".

Same page, line 13, before "of rubber" insert—

[In margin]: (A 5) Copied

The packing member 15 is indicated as being of frusto-conical shape so that it is adapted to wedge within the upper end of the "rat hole" within the well bore and thus seal the formation below from the pressure of the mud-laden fluid within the well. For this purpose, the packer member 15 may, for example, be composed—.

Page 5, line 4, before "bushing" change "a" to—the
head or—; line 5, after "19" insert—of the valve—, and
after "which" insert—head—.

Same page, after line 18, insert the following paragraph:

[In margin]: (A 6)

¶ It will be seen from the foregoing description that I have provided a valve at the end of the casing 23 which can be manipulated as desired from the surface of the well to close or open the empty chamber or conduit provided by the pipe or casing 23. The slot 24 and pin 25 between the head 19 and body 4 of the valve provides a means by which the relative rotation between the head and body of the valve may be limited in order to facilitate registering the passages in the head with those in the body of the valve.—

[In margin]: (A 7) copied

Page 5, line 19, before "invention" insert—preferred apparatus of the—, and after "invention" insert—

---

and practicing the preferred method of testing formations through use of said apparatus—.

Same page, lines 19 and 20, cancel "attached to a string of casing of which 23 is a part and".

87 19

penetration of the lower end of the testing apparatus into a so-called "rat hole", or an extension of the well bore of reduced diameter, the bottom of the hole thus leaving the hole provided with a seat above the formation to be tested which may be employed for setting of water or other string of casing if the test on the well establishes the productivity of a formation.

Various further objects and advantages of the present invention will appear from a description of a preferred form or example of the present invention. For this purpose, reference is made to the accompanying drawings which illustrate an apparatus embodying the invention and which further illustrate one example of an apparatus which is suitable for use in carrying out the process embodying the present invention. —

[Written]: (X) See original

Page 3, after line 9, insert the following paragraph:

[In margin]: Copied (A 2) See over

¶ The example of the apparatus illustrated is shown as consisting mainly of the following principal elements: A casing 23 or other means adapted to provide an empty chamber or conduit which may be lowered into a well bore and, when so lowered, provide an empty chamber adjacent the formation

87 17

[In margin]: (A 2 Contd)

o be tested. In the preferred form of the invention where this member comprises a casing 23, there will thus e provided an empty chamber or conduit extending from he formation to be tested up to the top of the well hole. The invention also comprises as the second major element valve including the valve body 4 and head or bushing 9, which is adapted to normally close such chamber or onduit 23 from communication with the mud-laden fluid ithin the well and adapted to be operated when the device as been lowered into position within the well hole to ermit the cognate fluids of the formation to discharge nto the empty chamber or conduit provided by the pipe 3. The apparatus is also illustrated as preferably comrising a packer 15 or other means for sealing off the ormation to be tested from the pressure of the head of nud-laden fluid within the well bore. The invention is lso illustrated as comprising an inlet member 12 below ne packer and valve, through which the fluids from the ormation to be tested may be permitted to discharge into ne conduit or chamber formed by the casing or pipe 23 hen the valve is operated as later described. —v

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[Written]: See original

Page 3, line 10, after "drawings", insert—the body—; ne 11, change "designate" to—preferably formed of—.

[In margin]: Copied (A 3)

Page 5, line 22, change "rotate" to—close the valve by rotating—.

Page 6, before line 1, insert the following paragraph:

[In margin]: (A8)

¶ In this manner there is thus established an empty chamber or conduit adjacent the formation to be tested without the necessity of removing the mud-laden fluid from the well hole. It should be pointed out that the entrance of the mud-laden fluid into the empty chamber or conduit of the pipe or casing 23 should be prevented during the lowering of the apparatus in the well in order to prevent the pressure of the mud-laden fluid from filling up this empty chamber or conduit, whereby it would impose its hydraulic head upon the formation to be tested when the valve is opened and thus defeat the object of the testing method.—

Page 6, line 15, after "casing 24.", insert—

[In margin]: (A9)

It will be obvious that if the pressure of the cognate fluids within the formation is sufficiently high that production may then take place through the casing 23. When the pressure is not sufficient for this purpose and—

Same page, line 22, change "device" to — valve and packer —.

Same page, line 23, after "bit" insert — to the drill stem —.

Same page, same line, cancel "promptly".

Same page, after line 25, insert the following paragraph:

[In margin]: (A 10)

¶ It will be apparent that the packer 25 operates to remove the pressure of the mud-laden fluid in the well from the cognate fluids of the formation, which are then free to discharge into the empty conduit formed by the

87 20

-8-

10802

[In margin]: (A 10 Contd)

casing 23 whenever the valve is opened to permit communication between the formation and this empty conduit. It will be further seen that as soon as the valve is closed and the testing apparatus started to be removed from the formation, thus releasing the packer, the pressure of this mud-laden fluid is again immediately reimposed upon the formation, thus preventing further discharge of the fluids of such formation. In this manner the well is always under control and no danger of blowouts encountered. Moreover, the conduit being positively closed, during the withdrawal of the apparatus, the mud-

laden fluid within the well cannot contaminate the sample or otherwise interfere with the testing operation.—

Page 6, line 28, after "embodiment" insert —of the apparatus —.

Same page, last line, to and including line 2 of Page 7, cancel "such changes and modifications being restricted only by the scope of the following claims" and substi-

[In margin]: (A 11)

tute]— and the particular embodiment of the method of the present invention is not limited nor dependent upon the use of the particular apparatus described nor is it limited to the particular details of the preferred method, but both method and apparatus of the present invention include all such changes, modifications, substitutions and equivalents as come within the scope of the following appended claims —.

[Written]: (X)

Kindly add the following new claims:

—~~8. A method of testing the productivity of a formation encountered in drilling a well which comprises~~

[In margin]: A 12

~~lowering to said formation an empty conduit closed from communication with the contents of the well, opening said conduit to permit the cognate fluids of the formation to discharge into said empty conduit, positively~~

87 21

~~closing the conduit, and withdrawing the conduit with its liquid to the top of the well.~~

~~9. A method of testing the productivity of a formation in a well, which comprises lowering to the formation an empty conduit, sealing off from the formation the hydraulic pressure of the fluid within the well, permitting the cognate liquids of the formation to discharge into said conduit, closing the conduit against the entrance of outside fluid, and removing the conduit with such liquids to the top of the well.~~

~~10. A method of testing the productivity of a formation in a well, which comprises establishing an empty conduit leading from the formation to the top of the well, sealing off the hydraulic head of the liquids within the well from said formation, permitting the cognate liquids within the formation to discharge into said empty conduit, reimposing the hydraulic pressure of the liquids within the well on the formation, closing the conduit against entrance of the mud laden fluid within the well and while so closed removing the conduit to the top of the well.~~

[In margin]: ~~Sub B 1~~

~~11. A method of testing the productivity of a formation in a well which comprises lowering to the formation an empty conduit, closed at its lower end and provided with a tube adapted for penetrating a "rat hole" in the formation, permitting the cognate fluids~~

~~of the formation to discharge into said empty conduit and then removing the conduit to the top of the well.~~

[In margin]: Per B

~~12. An apparatus for testing the productivity of a formation in a well, comprising a conduit adapted to be lowered into a well to the formation, said conduit be-~~

~~an induction member~~

~~ing closed from the liquids within the well,~~ ^ ~~a tube at~~

87 22

-10-

10804

[In margin]: Per B

~~the lower end of said conduit adapted to enter a "rat~~

~~from the top of the well~~

~~hole" in the formation, and a means operative~~ ^ ~~to establish communication through said tube between the conduit and formation to permit the cognate fluids of the formation to discharge into said conduit.~~

~~13. An apparatus for testing the productivity of a formation in a well, comprising a conduit adapted to be lowered into a well to the formation, said conduit being closed from the liquids within the well, a tube~~

~~at the lower end of said conduit adapted to enter a "rat hole" in the formation, and a means operative to establish communication through said tube between the conduit and formation to permit the congnate fluids of the formation to discharge into said conduit, and means adapted to seal the formation from the hydraulic pressure of the liquids standing within the well.~~

[In margin]: Sub C 2

~~14. In an apparatus for testing the productivity of a formation encountered in a well, means adapted to be lowered in the well and provide an empty conduit from the formation to the top of the well, means carried thereby adapted to penetrate the formation, means for sealing the formation from the hydraulic pressure of the fluid standing within the well, means operative with the apparatus in the well for permitting the fluids within the formation to discharge into said empty conduit, and means operative from the top of the well for closing the conduit against entrance of fluid within the well during the ascent of the conduit.~~

~~15. In an apparatus for testing the productivity of a formation encountered in a well, means adapted to be lowered into a well and provide an empty chamber adjacent the formation to be tested, a valve adjacent the lower end~~

87 23

~~of said chamber for opening and closing said chamber, and means for operating said valve from the top of the well.~~

~~16. In an apparatus for testing the productivity of a formation encountered in a well, means adapted to be lowered into the well and provide a chamber adjacent the formation to be tested, an inlet tube adapted to extend therefrom into a hole of less size than the well bore in said formation, a valve adjacent the lower end of said chamber for opening and closing said chamber, and means for operating said valve from the top of the well.~~

[In margin]: Per B

~~15~~ ~~17.~~ ~~In an apparatus for testing the productivity of a formation encountered in a well, means adapted to be lowered into a well and provide an empty chamber adjacent the formation to be tested, means adapted to extend therefrom into a "rat hole" in said formation, packing means adapted to engage the upper part of said "rat hole", and means for opening and closing said conduit.~~

[In margin]: Sub C 2

~~16:~~ ~~18.~~ ~~In a method of testing the productivity of formation encountered in a well, forming a hole in~~ ~~said formation of less size than the well bore, lowering an empty~~ conduit ~~to said formation until its inlet end is in said hole, packing off the fluid within the well bore, permitting the fluids in said formation to enter~~

[In margin]: " B v

conduit conduit

~~said~~ ^ ~~chamber, closing said chamber~~ ^ ~~against entrance~~

conduit

~~of fluid, and removing said chamber~~ ^ ~~from the well.~~

~~17~~ ~~19.~~ ~~In apparatus for testing the productivity of formations encountered in drilling, the combination of a casing open to the formation and extending to the surface of the ground, and a valve in the casing below the surface of the ground and operable from the surface to be opened and closed at will.~~

87 24

"bailers". These devices are not intended to make a test of the formations of a well while leaving the mud fluid within the well but are devised and employed for the purpose of removing the mud-laden fluid itself from the well. It is believed that the Examiner will readily see that none of the present claims reads on these references.

The main reference relied upon by the Examiner is the patent to Steele. This patent does not lower an empty conduit to a formation in a well but lowers a conduit to the formation and then excludes liquid therefrom by blowing air down the conduit. No test can be made by the device of the Steele patent unless the pressure upon the fluids in the formation is sufficiently high to force said fluids to the top of the well, inasmuch as there is no means shown for entrapping fluids within the conduit and elevating the same to the top of the well. For example, in claim 13, the element of a conduit closed from the liquids within the well is not present, since the conduit of the Steele device is entirely open to the fluids within the well during the ascending and descending operations. Moreover, the inlet member of the Steele device is not intended to be positioned in a "rat hole" or hole of reduced size at the bottom of the well and is shown of such a size that it could not successfully be lowered into such a "rat hole". Claim 13 thus distinguishes from the references in this particular.

Claims 1 to 3 are clearly not anticipated by the Steele reference for the reason that they call for a rotatable bushing having a passage adapted to register with a passage in the body of the device. While the parts of the Steele device may be rotative during the assembly process, they do not so operate at any time after assembly, nor would any such relative rotation accomplish any useful function in the Steele apparatus, and it is not

believed that the reference is proper anticipation of the claims.

The attention of the Examiner is directed to patents with which applicant is familiar, namely, those to Cox, No. 1,347,534, issued July 27, 1920, and Edwards, No. 1,514,585, issued November 4, 1924. These patents are mentioned in order to facilitate the prosecution of the application by explaining to the Examiner wherein these references are not anticipations of any of the claims now presented.

The Cox patent discloses a device which is intended to be lowered into a well containing a packer at its lower end for shutting off the formation from the mud fluid within the well and providing an empty conduit which will then lead from the formation to the top of a well. The lower end of said conduit is closed by a fragile member which is intended to be broken when the device lands at the bottom of the well and permit entrance of the test fluid into the conduit. This device has never been successfully used and cannot be successfully used in the testing of formations in a well. In this connection, it is pointed out to the Examiner that with a well of, for example, 4,000 feet in depth, the hydraulic pressure at the bottom of the well will be in the neighborhood of about 2,000 pounds per square inch. This pressure is so great that no fragile device supported by a flexible or rubber packer could be successfully used, as such fragile device would be crushed under the pressure or

~~relative rotation between said anchor means and said conduit.~~

~~22. An apparatus for testing the productivity of formations encountered in a well comprising a conduit adapted to be lowered through the mud fluid in said well to said formation, means swivelly carried by said conduit including a tapered packer adapted to be wedged in the upper end of a rat hole in the well and thus anchored in fixed rotary position, and a valve in said~~

87 32

-3-

~~conduit adapted to be operated by relative rotation between said anchor means and said conduit.~~

REMARKS

In preparing the above amendments, care has been taken not only to present claims which are believed allowable over the references of record, but to present claims which are believed allowable in view of an independent search made as to the novelty of the present invention.

As explained in the specification, the invention of the present application is one of very considerable importance

the oil well drilling art. The apparatus and method the present invention have been placed in practical where it has been successful in determining the stence or absence of oils, gas, or water in formans encountered in a well where there was no indication of the presence of such fluids from the top of the l. The present process and apparatus has been successfully used even for the purpose of determining substantially the rate of flow of oil from the well which can expected.

3oth the art cited by the Examiner and that unered by the independent search, disclose that for some e the importance of being able to make a test in the nner of the present invention has been recognized , as hereinafter pointed out, no one of the apparatuses processes previously devised can be successfully emyed for testing formations in a well, and it can be ven by affidavits, if the Examiner so desires, that apparatuses and methods of the testing devices relied on by the Examiner have not been placed in commer- use.

Of the patents cited by the Examiner, those to Boynton l Candee are not believed proper references, since they not relate to testing devices but are what are known the art as

87 33

Div. 38 Room 145 RAB/fbk Paper No. 2 rej. 4
Address only

"The Commissioner of Patents,
Washington, D. C."
and not any official by name

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

All communications respecting this application should give the serial number, date of filing, and name of the applicant

June 11, 1926.

Please find below a communication from the EXAMINER in charge of this application

Thomas E. Robertson
Commissioner of Patents

[Stamped]: MAILED JUN 11 1926

Lyon & Lyon
National City Bank Building,
Los Angeles, California.

Applicant: John T. Simmons
Ser. No. 87,323
Filed Feb. 10, 1926
For Method and Apparatus for Testing the Productivity of Formations Encountered in Wells

This application has been examined.

References made of record:

McGregor	582,828	May 18, 1897	166/19
Candee	1,505,624	Aug. 19, 1924	166/19
Boynton	1,508,771	Sep. 16, 1924	166/19
Steele	1,547,240	Jul. 28, 1925	166/21

Claims 1 to 3 inclusive are rejected on Steele, cited. The means which restrict the rotary movement of the bushing 4 in the Steele device, are, of course, the threads and shoulders.

Claims 4 to 7 inclusive are allowed.

Claims 8 to 11 inclusive are rejected as being improper method claims, in that they merely set forth the functions of applicant's device.

Claim 12 is rejected on Mc Gregor, cited.

Claim 13 is rejected on Steele, cited.

Claim 14 is allowed.

Claims 15 and 16 are rejected on Boynton or Candee.

Claim 17 is allowed.

Claim 18 is indefinite "said chamber" has no antecedent.

Claim 19 is rejected on Boynton.

Claim 20 appears allowable.

[In margin]: B

C. F. Krafft,
Acting Examiner.

107. 87 27

[Stamped]: U. S. Patent Office DEC 29 1926 DIVISION 38.

[Stamped in Margin]: MAIL ROOM DEC 28 1926 U. S. PATENT OFFICE

Serial No. 87,323 Paper No. 7

Amendment B

IN THE UNITED STATES PATENT OFFICE

John T. Simmons, :
METHOD AND APPARATUS FOR TESTING THE PRODUCTIVITY OF FORMATIONS ENCOUNTERED IN WELLS, : Division 38 - Room 145.

Filed February 10, 1926, :

Serial No. 87,323. :

Los Angeles, California,
December 21, 1926.

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

√

In response to the Office letter of June 11, 1926, kindly amend as follows:

√ In the amendment to the specification of March 9, 1926, page 4, line 28, change "conduit" to -cognate-.

√ Rewrite claims 8 to 11 and follows:

[In margin]: B 1

~~8.~~ ~~A method of testing the productivity of a formation encountered in a well, which includes lowering an empty conduit to said formation, packing off the formation from the fluid within the well bore, permitting the fluids in said formation to enter said conduit, closing said conduit against the entrance of fluid from the well, and removing said conduit with an entrapped sample of the cognate fluids of the formation from the well.~~

~~9.~~ ~~A method of testing the productivity of a formation encountered in a well having a mud-laden fluid therein, which includes lowering an empty conduit to said formation through said mud-laden fluid, packing off the mud-laden fluid within the well bore from said formation, permitting the fluids~~

87 30

~~in said formation to enter said conduit,~~ ^ ~~and maintaining the mud fluid of the well substantially quiescent during the flow of fluids from said formation into said conduit.~~

~~10. A method of testing the productivity of a formation in a well which comprises lowering an empty conduit to said formation through the mud fluid of the well, packing off the mud fluid within the well bore from said formation, permiting the cognate fluids within the formation to discharge into said empty conduit, reimposing the hydraulic pressure of the liquids of the mud fluid within the well on said formation, closing said conduit against entrance of said mud fluid, and removing said conduit with the entrapped quantity of cognate fluid of the formation from the well.~~

[In margin]: Per C Sub C 2

~~11. A method of testing the productivity of a formation in a well, which comprises forming a hole in said formation of less size than the well bore, lowering an empty conduit to said formation through the mud fluid of the well until its inlet line is in said hole, packing off the mud fluid within the well from said formation, and permitting the cognate fluids of the formation to enter said conduit.~~

√ Claim 12, line 4, change "^a tube" to –^an induction member–. Line 6, after "operative" insert –from the top of the well–.

√ Cancel claims 15 and 16.

√ Claim 18, line 7, both occurrences, change "chamber" to –conduit–. Line 8, change "chamber" to –conduit.–.

√ Renumber the claims.

√ Add the following claims:

[In margin]: B 2 Sub C 2

~~19. In an apparatus for testing the productivity of a formation encountered in a well, means adapted to be lowered into the well and provide an empty chamber adjacent the formation to be tested while leaving mud fluid within the well, an inlet tube adapted to extend therefrom into a hole of less size than the well bore in said formation, a tapered packer adapted to engage the top of said hole and seal the formation from the mud fluid within the remaining hole, a valve adjacent the lower end of said chamber for opening and closing said chamber, and means for operating said valve from the top of the well.~~

~~20. An apparatus for testing the productivity of a formation encountered in drilling a well which comprises a conduit adapted to extend from the formation to the top of the well while the mud-laden fluid is within the well for establishing an empty conduit for test fluid, a packer swivelly connected to said conduit, and a valve for said conduit adapted to be operated from open to closed position by relative motion between said packer and conduit.~~

~~21. An apparatus for testing a formation encountered in a well comprising a conduit adapted to be lowered into a well, means carried by said conduit adapted to be anchored in a fixed rotary position in the well and a valve for said conduit adapted to be operated by~~

~~18 20. In apparatus for testing the productivity of formations encountered in drilling, the combination of a casing open to the formations and extending to the surface, a valve in the casing near its bottom and operable from the surface of the ground, and a packer near the bottom of the casing.~~

[In margin]: Insert B 2

REMARKS

A study of the invention demonstrates that the inventor has devised not only a new apparatus but apparently a new method of testing the productivity of formations in a well, and therefore the specification and claims have been amended in order to cause the claims to cover more nearly all of the invention. It will be apparent that no change has been made either in the description of the device or of the method, as both the device and the method were clearly originally disclosed, and that the amendments to the specification are mainly for the purpose of more clearly pointing out the broad scope of the invention and the results to be accomplished thereby and for the purpose of forming certain broader terminology to be employed in the apparatus and method claims.

Respectfully submitted,

Lyon & Lyon
Attorneys for Applicant.

RFL MK

SUUPLEMENTAL OATH

STATE OF Oklahoma)
)
COUNTY OF Stephens)

[Stamped in margin]: APPLICATION DIV. MAR 24 1926 U. S. PATENT OFFICE

JOHN T. SIMMONS, whose application for letters patent for an improvement in WELL TESTING DEVICES, Serial No. 87323, was filed in the United States Patent Office on or about the 10th day of February, 1926, being duly sworn, deposes and says that the subject matter of the foregoing amendment was part of his invention, was invented before he filed his original application, above identified, for such invention, was not known or used before his invention, was not patented or described in a printed publication in any country more than two years before his application, was not patented in a foreign country on an application filed by himself or his legal representatives or assigns more than twelve months before his application, was not in public use or on sale in this country for more than two years before the date of his application, and has not been abandoned.

John T. Simmons

Sworn to and subscribed before me this 15 day of March, 1926.

[Seal] A L Dempsey

Notary Public in and for the County of Stephens

State of Oklahoma

My Commission Expires November 12, 1929

87 26

[Written]: # 5.
[Written]: DOC

[Stamped]: MAIL ROOM JUN 14 1926 U. S. PATENT OFFICE

[Stamped in margin]: DOCKET DIVISION JUN 14 1926 U. S. PATENT OFFICE

POWER OF ATTORNEY

To the Commissioner of Patents:

I, JOHN T. SIMMONS of Eldorado, Arkansas, having invented certain new and useful improvements in WELL TESTING DEVICES, for which I have filed application for Letters Patent of the United States, Serial No. 87,323, filed February 10, 1926, do hereby appoint the firm of Lyon & Lyon, (the individual members of which firm are Frederick S. Lyon and Leonard S. Lyon) of 708 National City Bank Building, Los Angeles, California, my attorneys in the matter of the said application, with full power of substitution and revocation, to sign the drawings, make amendments and alterations in said application, to receive the patent and to transact all business in the United States Patent Office in connection therewith; hereby revoking any and all Powers of attorney heretofore given by me in the matter of the said application.

Dated May 24th, 1926.

John T. Simmons

I hereby ratify and confirm the above Power of Attorney and revocation.

Erle P. Halliburton
Assignee

[Stamped]: JUN 15 1926
T. E. Robertson
Commissioner

87 28

EEG #6

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

June 17, 1926.

Lyon and Lyon
708 National City Bank Bldg.,
Los Angeles, Calif.

Applicant John T. Simmons
Serial No. 87,323
Filed............Feb. 10, 1926
For........Method and Apparatus for Testing the Productivity of Formations Encountered in Wells.

In this case your power of attorney has been accepted.

Respectfully
Thomas E. Robertson
Commissioner.

11—8898

Revoking power of attorney
to
Wilkinson and Giusta,
Ouray Bldg.,
Washington, D. C.

87 29

the flexible device collapsed and the fragile element lost out of the device. Moreover, the device of the Cox reference employs as the conduit for the test fluid, a flexible hose 13 which is subjected to the hydraulic pressure of the mud-laden fluid within the well through the ports 4. Such a rubber hose would unquestionably collapse under such pressure, entirely preventing any successful testing. Moreover, when the testing device of the Cox patent is reaised from the bottom of the well, there is nothing to prevent the mud

87 35

fluid of the well from entering the conduit through the perforations 8 by the clapper valve 15, intermingling the test fluid to such an extent as to spoil entirely the testing operation. The attention of the Examiner is drawn to the fact that the patentee Cox provided a clapper valve 15 with the idea of preventing the fluids within the hose 13 from dropping out of the testing device, forgetting that the mud-laden fluid surrounding the testing device would be under a much higher pressure and that what is necessary is a device to prevent

mud-laden fluid entering and commingling with the
pped test fluid.

e Cox patent is an enlargement upon the McGregor
t, relied upon by the Examiner in rejecting claim
nd it is believed that claim 12 is allowable over the
ence McGregor for the reasons explained in the dis-
on of the Cox reference. The McGregor device is
usly not adapted to provide an empty conduit at
bottom of a well hole, and does not disclose any
s by which the passage of fluid into the said conduit
l be successfully controlled from the top of the

nother important distinction between the Cox refer-
and applicant's device is that during the purported
g operations of the Cox device, mud-laden fluid is
nuously passed down through the casing 1 of the
device and out the ducts 4 for the purpose of cir-
ing the mud-laden fluid within the well. The pur-
of the patentee of this circulation was to provide a
s for preventing the mud-laden fluid from settling
the testing device and freezing the same in the well
Applicant has discovered, however, that this cir-
ion is the means of defeating the very object which
as designed to accomplish. When the lower end
e testing device is packed to the formation any cir-
ion of the mud-laden

87 36

fluid thereabove merely tends to wash down upon the packer of the testing device material from the well hole, freezing the same in place. The Examiner will, therefore, find several of the newly submitted claims carrying limitations to the effect that the mud-laden fluid is maintained quiescent during the testing operations.

The patent to Edwards discloses a testing device similar

—

to Cox, in that the patentee intended to circulate the mud-laden fluid during the testing operation. This patent differs from Cox in that it has a conduit which can be opened and closed from the top of the well but for this purpose, the patentee requires two separate strings of casing telescoped one within the other, and a means for independently moving these casings. Moreover, the device of the reference does not disclose an apparatus which can be successfully utilized for packing off the mud-laden fluid of the well from the formation to be tested. The packer of the Edwards device is intended to

———

be operated by bowed springs. These bowed springs necessarily have to come into contact with the loose earth and formation at the bottom of the well, which is not capable of applying to the springs any very substantial resistance. It is, therefore, impossible that the springs of the Edwards patent can apply to the packer 5 sufficient force to maintain the same packed against the walls of the well, against the tremendous hydraulic pressure of the mud-laden fluid at the bottom of a well.

Claims 8 to 11 inclusive have been rewritten to overcome the objection to the claims that they were in improper method form. The new claims are believed to be largely self-explanatory in view of the preceding careful discussion of the references cited and the advantages of applicant's device over such references. It will be found that each one of the newly

87 37

added claims distinguish from the references, and it is believed that they are clearly allowable, and such allowance is requested.

Respectfully submitted,

Lyon & Lyon
Attorneys for Applicant.

RFL:LR

87 38

Serial No. 87,323 Paper No. 9

Amendment C

[Stamped]: U. S. Patent Office JUN 17 1927 DIVISION 38

[In margin]: APPLICATION DIV. JUN 17 1927 U. S. PATENT OFFICE

10812

IN THE UNITED STATES PATENT OFFICE

John T. Simmons,	:	
METHOD AND APPARATUS FOR TESTING THE PRODUCTIVITY OF FORMATIONS ENCOUNTERED IN WELLS	:	Division 38, Room 145
Filed February 10, 1926,	:	
Serial No. 87,323	:	

Washington, D. C.
June 17, 1927.

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

In response to Office letter of May 20, 1927, please amend as follows:

√ Claim 1, line 7, cancel the period and add —to receive the sample to be tested.—

√ Claim 2, line 7, and claim 3, line 9, change the period to a comma and add / –√–said passages being

[In margin]: (C1) per E.

, said packer adapted to be positively pressed against the walls of the formation to seal off the same

constructed to receive the material to be tested^

√ Cancel claims 8-22 and add the following claims:

[In margin]: C2

~~23. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering a sample chamber into the well through the drilling fluid to the formation to be tested, the chamber being closed against the entrance of fluid from the well during the lowering operation, sealing off the well above the formation to exclude the drilling fluid from the formation, opening the chamber to permit cognate fluid from the formation to enter the chamber, closing the chamber against the entrance of~~

[In margin]: Per D.

~~fluid from the well, releasing the seal X and removing the chamber so closed to withdraw an entrapped sample of fluid from below the point at which the well was sealed off.~~

E 1

[In margin]: Insert E 1 (here)

12. . ~~29.~~ Apparatus for testing a formation encountered in a well containing drilling fluid, which includes a single string of pipe to be lowered into the well to adjacent the formation to be tested, a valved inlet at the lower end of the pipe, positively controlled from the top of the well by movement of the pipe and a packer carried by the pipe above the inlet, said packer being

[In margin]: per E.

adapted to be positively pressed against the walls of the formation to seal off the same.

87 42

-3-

10815

13. ~~30.~~. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes an empty string of pipe to be lowered into the well to adjacent the formation to be tested, a

[In margin]: per E.

adapted to be positively pressed against the walls of the formation to seal off the same

packer carried by the pipe ^ , means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

[In margin]: (C 2 Contd)

14. ~~31~~. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the forma-

[In margin]: Per E. JK

, said sealing means being adapted to be positively pressed against the walls of the formation to seal off the same

tion to be tested ^ , means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

15. ~~32~~. Apparatus for testing the productivity of a formation encountered ~~in~~ a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling

[In margin]: Per E.

, said packer adapted to be positively pressed against the walls of the formation to seal off the same

fluid from the formation to be tested ^ , means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for

87 43

[In margin]: (C2)

8, ~~24~~. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe. raising the pipe so closed to remove an entrapped sample and the packer from the well.

[Written]: (X)

~~25. A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valved inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognate fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against the entrance of fluid from the well to remove an entrapped,~~

[In margin]: D.

~~sample (and the packer.)~~

9. ~~26~~. Apparatus for testing a well comprising a string of pipe to be lowered into a well having an in-

[In margin]: per E.

packer adapted to be positively pressed against the walls of the formation to seal off the same

let at its lower end and carrying a ^ ~~packing for sealing the well~~ above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

10. ~~27~~. Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer car-

[In margin]: per E.

said packer adapted to be positively pressed against the walls of the formation to seal off the same

ried by the pipe ^ and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

[In margin]: (C 2 Contd)

11. ~~28~~. Apparatus for testing a well containing drilling fluid, which includes an empty string of pipe to be lowered in the well to adjacent the formation to be tested, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve for controlling the inlet, and means carried by the pipe for sealing the well above the

(2)

inlet ^ , the valve being positively controlled by movement of the pipe.

controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

[In margin]: (C 2 contd)

16. ~~33.~~ Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer carried by the pipe for sealing off the well above the formation an inlet below

[In margin]: Per E. JK

, said packer adapted to be positively pressed against the walls of the formation to seal off the same

the packer opening into the pipe ^ , and a valve for the inlet, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

~~34. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, means carried by the string of pipe to permit the flow of cognate fluid from the formation into the pipe, said means including relatively movable parts having passages adapted to be brought into alignment to allow the fluid to flow into the pipe and brought out of alignment to retain the fluid in the pipe, and a packer~~

~~mounted on one of said parts for sealing off the drilling fluid from the formation while the passages are aligned.~~

[In margin]: Per D.

~~35. Apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove~~

87 44

-5-

10817

~~the entrapped sample, said pipe being closed against the flow of drilling fluid as the pipe is lowered into the well, a packer carried by the pipe as the pipe is lowered into (and removed from) the well and adapted to be seated by manipulation of the pipe to seal off the well above the formation, an inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well~~

[In margin]: Per D.

RAB/hm

Div. 38 Room 145 Paper No. 8–Rej.

Address only

"The Commissioner of Patents,
Washington, D. C.,"

and not any official by name

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

All communications respecting this application should give the serial number, date of filing, and name of the applicant

May 20, 1927

Please find below a communication from the EXAMINER in charge of this application.

Thomas E. Robertson
Commissioner of Patents.

Applicant: John T. Simmons
Ser. No. 87323
Filed Feb. 10, 1926
For Method and Apparatus for testing the Productivity of Formations Encountered in Wells

[Stamped]: PATENT OFFICE MAY 20 1927 MAILED

Lyon & Lyon,
708 Natl. City Bank Bldg.
Los Angeles, Calif.

Amended December 28, 1926.

Claims 1-3 are again rejected on *Steel* of record. The claims are readable on the Steele disclosure and must define a patentable difference.

Claims 4 to 7 inclusive stand allowed.

The remaining claims are rejected on the patent to Edwards, made of record by applicant. Claim 13 is further and again rejected on Steele. The Steele device is adapted to fit a rat hole of suitable size.

Many of the claims are readable on the Cox patent. made of record by applicant.

[In margin]: B.

C. F. Krafft
Examiner.

107 87 39

THIS ACTION MUST BE RESPONDED TO
WITHIN SIX MONTHS.

[In margin]: (C 2 contd)

17. ~~36.~~ Apparatus for testing a well containing drilling fluid, comprising a single string of pipe to be lowered into the well through the drilling fluid, said pipe being closed against the entrance of the drilling fluid, means at the lower end of the pipe for receiving a sample including an inlet opening into the pipe, means carried by the pipe for sealing the well above the in-

[In margin]: JK E

, said sealing means adapted to be positively pressed against the walls of the formation to seal off the same

let ^ , and a valve for the inlet that may be positively opened and closed by movement of the pipe while the well is sealed above the inlet.

[In margin]: dd ,D1, 1s 18 & 19

REMARKS.

New claims have been substituted for the rejected claims pursuant to an interview with the Examiner. This has been done to facilitate the consideration of the case and to place the claims in better form. It is not admitted by applicant that the references disclose the invention or meet the rejected claims.

87 45

Edwards discloses an arrangement in which it is necessary to lower two strings of pipe into the well to make a test: A a drill stem carrying a packer and B a sample string. Edwards does not recover an entrapped sample and could not according to his disclosure for he teaches to withdraw the apparatus when the packer is first released and the test stem is then withdrawn before withdrawing the drill pipe and packer. Edwards directs that the packer be released before stopping the slush pump which necessarily involves the passage of drilling fluid into the sample string. The mode of operation embodied in applicant's invention and the arrangement of parts embraced in applicant's invention are entirely different and superior to Edwards.

Cox provides a frangible closure to keep the test tube free of drilling fluid while his structure is being lowered into the hole but after this frangible element is once broken Cox provides no means for closing his test tube against the entrance of fluid from the well. The check valve 15 illustrated by Cox does not function to close the test tube from the entrance of fluid and upon the release of the packer the superior pressure of the mud laden fluid would result in the passage of fluid into the sample string. Both Cox and Edwards insert two conduits into the well for the purpose of taking a test and have each employed the outer conduit for the purpose of circulating drilling fluid during the test operation. Applicant's teaches the use of a single test string carrying the valve structure and the packer and his invention represents

87 46

the difference between an established success and an established abandoned failure. Claims 1 to 3 have been amended to provide that the passages which are rotated into alignment are to receive the material to be tested which is not true of *Steel*. All of the claims are now understood to be allowable and an early action is requested.

Respectfully submitted,

Lyon & Lyon
Attorneys for Applicant.

87 47

Div. 38 Room 145 Paper No. 11

Address only

"The Commissioner of Patents,

Washington, D. C.,"

and not any official by name

RAB/B

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

All communications respecting this application should give the serial number, date of filing, and name of the applicant

[Stamped]: PATENT OFFICE JUL 13 1927 MAILED

July 13, 1927

Please find below a communication from the EXAMINER in charge of this application.

Thomas E. Robertson
Commissioner of Patents

[Stamped]: APPLICATION DIV. JUN 22 1927 U
S. PATENT OFFICE

7 Bry

Patent No. 87,323 Paper No. 10
Asso. Power of Atty.

Div. No. 38 Room No. 1

ASSOCIATE POWER OF ATTORNEY.

Applicant John T. Simmons

Improvement in Method and Apparatus for Testing t
Productivity of Formations Encountered in We

Filed Feb. 10, 1926
Serial No. 87,323

Phone Main 37

In the U. S. Patent Office.

Hon. Commissioner of Patents:

Sir:

Please recognize J. M. MASON, McGill Buildi
Washington, D. C., Registry No. 11532, as....our....as
ciate in the above-entitled application, and address
communications to him.

Lyon & Lyon
Attorney of Record

87 48

Applicant: John T. Simmons
Ser. No. 87323
Filed Feb. 10, 1926

For Method and Apparatus for
Testing the Productivity of
Formations Encountered on Wells.

J. M. Mason,
McGill Building,
Washington, D. C.

Applicant's claims appear to be allowable.

Further action in this case will await consideration of a possible interference proceeding.

G. D. G. Nicolson,
Acting Examiner

[Written]: B.

107 87 -49

THIS ACTION MUST BE RESPONDED TO
WITHIN SIX MONTHS.

(Drawing)

[For copy of this drawing accompanying patent 1,930,-987, filed Feb. 10, 1926, see Plaintiffs' Exhibit 1 heretofore set forth.]

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Bryant:MEB

Div. 38 Room 145 Paper No. 12

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DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

All communications respecting this application should give the serial number date of filing, and name of the applicant

[Written]: Copy sent Assignee

[Written]: A

[Stamped]: PATENT OFFICE OCT 10 1927 MAILED.

Please find below a communication from the EXAMINER in charge of this application

Thomas E. Robertson
Commissioner of Patents

[Stamped]: OCT 5 - 1927

Applicant: John T. Simmons,
Ser. No. 87,323
Filed Feb. 10, 1926,
For Method and Apparatus
for Testing the Productivity
of Formations Encountered in
Wells.

J. M. Mason,
McGill Bldg.,
Washington, D. C.

The case, above referred to, is forwarded to the Examiner of Interferences because it is adjudged to interefere with others, hereafter specified. The question of priority will be determined in conformity with the Rules. The interference will be identified as No. 55940 On or before NOV 14 1927 the statement demanded by rule 110 must be sealed up and filed with the subject of invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is

[Written]: p 24-25

Count 1.

A method of testing the productivity of a formation in a well containing drilling fluid, which includes lowering a sample chamber into the well through the drilling fluid to the formation to be tested, the chamber being closed against the entrance of fluid from the well during the lowering operation, sealing off the well above the formation to exclude the drilling fluid from the formation, opening the chamber to permit cognate fluid from the formation to enter the chamber, closing the chamber

against the entrance of fluid from the well, releasing the seal and removing the chamber so closed to withdraw an entrapped sample of fluid from below the point at which the well was sealed off.

Count 2.

A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well.

[Written]: 8

Count 3.

A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes

[Written]: p 25

87—50

lowering a test string into the well through the drilling fluid with a packer carried by the string and a valved inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognate fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against the entrance of fluid from the well to remove an entrapped sample and the packer.

Count 4.

[In margin]: √

Apparatus for testing a well comprising a string of pipe to be lowered into a well having an inlet at its lower end and carrying √ for sealing the well above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

Count 5.

[In margin]: √

Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer carried by the pipe and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

Count 6.

[In margin]: √

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which

includes an empty string of pipe to be lowered into the well to adjacent the formation to be tested, (a packer carried by the pipe, means at the lower , end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling, the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

Count 7.

[In margin]: √

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

Count 8.

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into

87 51

said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

Count 9.

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single, empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer carried by the pipe for sealing off the well above the formation, an inlet below the packer opening into the pipe, and a valve for the inlet, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

Count 10.

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, means carried by the string of pipe to permit the flow of cognate fluid from the formation into the pipe, said means including relatively movable parts having passages adapted to be brought into alignment to allow the fluid to flow into the pipe and brought out of alignment to retain the fluid in the pipe, and a packer mounted on one of said parts for sealing off the drilling fluid from the formation while the passages are aligned.

Count 11.

Apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising a string

of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove the entrapped sample, said pipe being closed against the flow of drilling fluid as the pipe is lowered into the well, a packer carried by the pipe as the pipe is lowered into and removed from the well and adapted to be seated by manipulation of the pipe to seal off the well above the formation, an inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well.

Count 12.

Apparatus for testing a well containing drilling fluid, comprising a single string of pipe to be lowered into the well through the drilling fluid, said pipe being closed against the entrance of the drilling fluid, means at the lower end of the pipe for receiving a sample including an inlet opening into the pipe, means carried by the pipe for sealing the well above the inlet, and a valve for the inlet that may be positively opened and closed by movement of the pipe while the well is sealed above the inlet.

The interference involves your application, above identified.

[Written]: 87 52

an application for "Apparatus for Testing Wells" filed by Charles L. Williams, whose post office address is 969 B Union Trust Bldg., Pittsburgh, Pa; whose attorney is Archworth Martin, 513 Union Trust Bldg., Pittsburgh,

—

Pa.; an application for "Well Tester" filed by Otto J. Allen whose Post office address is 409 Sames-Moore Bldg., Laredo, Webb County, Texas, whose attorney is Hardway & Cathey, 428 Bankers Mortgage Bldg., Houston, Texas; an application for "Well Testing Tools" filed by Conrad T. Neitzel, whose post office address is 2236 Live Oak St., Dallas, Texas; whose attorney is Jack A. Schley, 904 Allen Bldg., Dallas, Texas; whose associate attorney is Alfred T. Gage, 3915 Legation St., Washington, D. C.; an application for "Well Tester" filed by Ernest Powell whose post-office address is Box 56A, Route 1, Von Orme, Texas; whose attorney is Jesse R. Stone, C/o Andrews,

—

Streetman, Logue & Mobley, Union National Bank Bldg., Houston, Texas; an application for "Well Testing Device" filed by Guy V. Lewis, whose post office address is Robert E. Lee Hotel, Laredo, Texas; whose attorney is Jesse R. Stone, Andrews, Streetman, Logue & Mobley, Union National Bank Bldg., Houston, Texas; an application for "Oil Well Packers" filed by David Erickson, whose post office address is Erickson Pattern Works, 508 Ohio Ave., Wichita Falls, Texas; whose attorney is Watson, Coit, Morse and Grindle, Mather Bldg., Washington, D. C.; an application for "Well Formation Testing Device" filed by Edgar Clinton Johnston, whose post office address is El Dorado, Union County, Arkansas; whose attorney is Clarence A. O'Brien Security Savings

& Commercial Bank Bldg., Washington, D. C.; whose assignee is Johnston Formation Testing Corporation of El Dorado, Arkansas; and an application for "Oil Well Testing Device" filed by Ernest H. Cox, whose post office address is Duncan, Stephens County, Oklahoma, and whose attorney is Eccleston & Eccleston of Loan & Trust

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Bldg.,

87 53

Serial No. 87,323—#5
Washington, D. C.

The relation of the counts of the interference to the claims is as follows:

Counts	Williams	Allen	Neitzel	Powell	Lewis	Erickson	Johnston	Cox	Simmons
1	15	13	18	8	10	16	6	7	23
2	16	14	19	9	11	17	7	8	24
3	17	15	20	10	12	18	8	9	25
4	18	16	21	11	13	19	9	10	26
5	19	17	22	12	14	20	10	11	27
6	20	20	25	15	17	23	13	14	30
7	21	21	26	16	18	24	14	15	31
8	22	22	27	17	19	25	15	16	32
9	23	23	28	18	20	26	16	17	33
10	24	24	29	19	21	27	17	18	34
11	25	25	30	20	22	28	18	19	35
12	26	26	31	21	23	29	19	20	36

(Counts Compared)

[Written]: B.

Respectfully,

C. F. Krafft

Examiner, Division 38.

87 54

[Written]: A

2—079

INTERFERENCE

nterference No. 55940 Paper No. 13

ame, John T. Simmons,

erial No. 87,323,

itle, Method and Apparatus for Testing the Productivity of Formations Encountered in Wells.

iled, Feb. 10, 1926

nterference with Otto J. Allen, Conrad T. Neitzel, Charles L. Williams Ernest Powell, Guy V. Lewis, √ David Erickson, Edgar Clinton Johnston Ernest H. Cox √

DECISIONS OF

aw Examiner, Interference dissolved as to cts. 1 & 10 only Dated, NOV 1 1928

x'r of Interferences, Favorable Dated, Sept. 20/29.

oard, ... Dated, ...

ommissioner .... Dated, ...

REMARKS:

....

....

....

....

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

87 55

Bryant:MEB

[Written]: B

Div. 38 Room 145 Paper No. 14

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

All communications respecting this application should give the serial number, date of filing, and name of the applicant

[Written]: Copy sent Assignee

Please find below a communication from the EXAMINER in charge of this application

Thomas E. Robertson
Commissioner of Patents

[Stamped]: OCT 5 - 1927

Applicant: John T. Simmons
Ser. No. 87,323
Filed Feb. 10, 1926
For Method and Apparatus for Testing the Productivity of Formations Encountered in Wells

[Stamped]: PATENT OFFICE OCT 10 1927
MAILED

. M. Mason,
IcGill Bldg.,
Vashington, D. C.

The case, above referred to, is forwarded to the Ex-
miner of Interferences because it is adjudged to interfere
ith others, hereafter specified. The question of priority
ill be determined in conformity with the Rules. The
terference will be identified as No. 55941 On or before
OV 14 1927 the statement demanded by rule 110 must
e sealed up and filed with the subject of invention, and
ame of party filing it, indorsed on the envelope. The
ibject-matter involved in the interferenc is

Count 1

Apparatus for testing a well containing drilling fluid,
hich includes an empty string of pipe to be lowered in
e well to adjacent the formation to be tested, means at
e lower end of the pipe to receive a sample from the for-
ation including an inlet opening into the pipe and a
alve for controlling the inlet, means carried by the pipe
r sealing the well above the inlet, the valve being posi-
vely controlled by movement of the pipe.

Count 2.

Apparatus for testing a formation encountered in a well
ntaining drilling fluid, which includes a single string of
pe to be lowered into the well to adjacent the forma-
on to be tested, a valved inlet at the lower end of the
pe positively controlled from the top of the well by
ovement of the pipe and a packer carried by the pipe
ove the inlet.

The interference involves your application, above identified, an application for "Well Tester", filed by Otto J. Allen, whose post office address is 409 Sames-Moore Bldg., Laredo, Webb County, Texas, whose attorney is Hardway & Cathey; 428 Bankers Mortgage Bldg., Houston Texas; an application for "Well Testing Tools" filed by Conrad T. Neitzel; whose post office address is 2236 Live Oak Street, Dallas, Texas; whose attorney is Jack A. Schley, 904 Allen Bldg., Dallas, Texas, whose associate attorney is Alfred T. Gage; 3915 Legation St., Washington, D. C.; an application for "Method of and Apparatus for Testing

87 56

Serial No. 87,323—#2

Wells, filed by Charles L. Williams, whose post office address is 130 N. Negley Ave., Pittsburgh, Pa.; whose attorney is Archworth Martin, 513 Union Trust Bldg., Pittsburgh, Pa.; an application for "Well Testor" filed by Ernest Powell, whose post office address is Box 56A, Route 1, Von Orme, Texas; whose attorney is Jesse R. Stone, C/o Andrews, Streetman, Logue, & Mobley, Union National Bank Bldg., Houston, Texas; an application for "Well Testing Device" filed by Guy V. Lewis, whose post office address is Robert E. Lee Hotel, Laredo, Texas; whose attorney is Jesse R. Stone; of Andrews, Streetman, Logue & Mobley, Union National Bank Bldg., Houston, Texas; an application for "Oil Well Packers" filed by David Erickson, whose post office address is

Erickson Pattern Works, 508 Ohio Ave., Wichita Falls, Texas; whose attorney is Watson, Coit, Morse & Grindle, Mather Bldg., Washington, D. C.; an application for "Well Formation Testing Device" filed by Edgar Clinton Johnston, whose post office address is El Dorado, Union County, Arkansas; whose attorney is Clarence A. O'Brien, Security, Savings & Commercial Bank Bldg., Washington, D. C.; whose assignee is Johnston Formation Testing Corporation of El Dorado, Arkansas; an application for "Oil Well Testing Device" filed by Ernest H. Cox, whose post office address is Duncan, Stephens County, Oklahoma, and whose attorney is Eccleston & Eccleston, of Loan & Trust Bldg., Washington, D. C.

The relation of the counts of the interference to the claims is as follows:

87 57

Serial No. 87,323—#3

Counts	Allen	Neitzel	Williams	Powell	Lewis	Erickson	Johnston	Cox	Simmons
1	18	23	15	13	15	21	11	12	28
2	19	24	16	14	16	22	12	13	29

(Counts Compared)

Respectfully,

C. F. Krafft

Examiner, Division 38.

87 58

[Written]: B

INTERFERENCE.

Interference No. 55941 Paper No. 15
Name, John T. Simmons,
Serial No. 87,323,

Title, Method and Apparatus for Testing the Productivity of Formations Encountered in Wells

Filed, Feb. 10, 1926

Interference with David Erickson, Guy V. Lewis, Charles L. Williams Ernest H. Cox, Edgar Clinton Johnston, Otto J. Allen, Conrad T. Neftzel, Ernest Powell.

DECISIONS OF

Primary Examiner, ...	Dated, ...
Ex'r of Interferences, Consolidated with Intf 55940	Dated, Dec. 22/28
Board, ...	Dated, ...
Commissioner	Dated, ...

REMARKS:

....

....

....

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

87 59

[Written]: In map's 55,940 & 55,941

[Written]: 87,323—16

[Stamped]: DOCKET DIVISION MAR 10 1928 U. S. PATENT OFFICE

Div. No. 38 Room No. 145

[Stamped]: DOCKET DIVISION MAR 10 1928 U. S. PATENT OFFICE

ASSOCIATE POWER OF ATTORNEY.

Applicant John T. Simmons

Improvement in METHOD AND APPARATUS FOR TESTING THE PRODUCTIVITY OF FORMATIONS ENCOUNTERED IN WELLS

Filed February 10, 1926

Serial No. 87,323

In the U. S. Patent Office.

Hon. Commissioner of Patents:

Sir:—Please recognize Mason & Mason, a firm composed of C. A. Mason and John M. Mason, Washington Loan and Trust Building, Washington, D. C., Registry No. 12505, as....our....associates in the above-entitled application, and address all communications to them, substituting said firm for John M. Mason, heretofore appointed associate attorney.

Lyon & Lyon

Attorney of Record.

[Written]: 87 - 60

[Written]: #17 D.

[Stamped]: APPLICATION DIV. Oct 30 1929 U. S. PATENT OFFICE

10820

IN THE UNITED STATES PATENT OFFICE

John T. Simmons,	:	
Well Testing Devices,	:	Division 38, Room 145.
Filed Feb. 10, 1926,	:	
Ser. No. 87,323	:	

The Honorable Commissioner of Patents,
Washington, D. C.

Sir:

Kindly amend as follows:

Cancel claims 23, 25, 34 and 35 and add the following claims:

[In margin]: (D 1)

¶18. ~~37~~. A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cogna*nt* fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising

the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample.

¶19. ~~38.~~ An apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove the entrapped sample, said pipe being closed

[Written]: 87 - 61

10821

John T. Simmons 87,323 -2-

[In margin]: (D 1 Contd)

against the flow of the drilling fluid as the pipe is lowered into the well, a packer carried by the pipe as the pipe is lowered into the well and adapted to be seated by manipulation of the pipe to seal off the well above the

[In margin]: Per. E. JK

, said packer adapted to be positively pressed against the walls of the formation to seal off the same

formation ^, and inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well.

[Written]: (Sig)

REMARKS

The interferences in which this application was involved having been terminated, the above amendment is made with the hope of securing immediate allowance. All of the claims remaining in the case stand allowed.

Claim 23 and claim 34 were found on a Motion to Dissolve to be unpatentable. These claims correspond to counts 1 and 10, respectively, of the interference 55940.

Cancelled claims 25 and 35 which stood allowed in this application, correspond to newly added claims 37 and 38. Claims 25 and 35 have been cancelled in accordance with the agreement with the Examiner to allow new claims 37 and 38 in place of the cancelled claims. At the interview the Examiner thought that the newly presented claims 37 and 38 were allowable over the art of record but that they were not patentably distinguished from claims 25 and 35. It is therefore requested that the claims be cancelled without prejudice. Claim 37

[Written]: 87 - 62

10822

John T. Simmons 87,323 -3-

will be found to correspond with allowed claim 25 or count 3 of the interference 55940, except that the words "and the packer", the last three words of claim 25, are left out of the new claim 37. After the packer has done its work there is no necessity that it be removed from the well and it is quite obvious that claim 37 is allow-

able, in view of the allowance of claim 25. Claim 37 also contains the addition of the word "with" after "fluid" line 5, which has been added to put the claim in better shape.

Similarly with respect to claim 38, this claim corresponds exactly with claim 35, or count 11 of interference No. 55940, except that the words "and removed from" in lines 8 and 9 of claim 35, have been omitted from claim 38. This is for the same reason, i. e., that the packer having accomplished its purpose is not necessarily removed from the well and a claim therefore which would cover the situation where the packer is left in the well, should be allowed, the substance of the invention being the same whether the packer is removed or not. In actual practice, packers may be set in a well hole and left therein. Moreover, in the use of the Simmons apparatus, the rubber packer on the tapered sleeve is generally placed on sufficiently loose so that if the packer is so tightly wedged as to stick the pipe, the packer may be pulled off the pipe by elevating the pipe.

It is believed that the foregoing amendment places this application in condition for immediate allowance and such allowance is urgently requested.

Respectfully submitted,

JOHN T. SIMMONS

By Lyon & Lyon

Attorneys.

October 30, 1929.

[Written]: 87-63

Div. 38 Room ;45 Paper No. 18

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

kh/d Nov. 1, 1929

All communications respecting this application should give the serial number, date of filing, and name of the applicant.

Please find below a communication from the EXAMINER in charge of this application.

Thomas E. Robertson
Commissioner of Patents.

[Stamped]: MAILED NOV 1 1929

Applicant: J. T. Simmons
Ser. No. 87,323
Filed Method & apparatus
For for testing the productivity of formations encountered in wells

Mason & Mason

Wash. Loan & Trust Bldg
City

Responsive amdt. 10/30/29.

Claims 37 and 38 are allowed.

Claims 1 to 7, 24, 26 to 33, 36 to 38 stand allowed.p

The passing of this case to issue is postponed for the purpose of considering another possible interference and in the near future applicant will receive either notice of allowance or notice of another interference.

[Written]: JK

C. F. Krafft
Examiner.

87-64

Div. 38 Room 145 Paper No. 19
kh/d

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

All communications respecting this application should give the serial number, date of filing, and name of the applicant

Dec. 4, 1929

Please find below a communication from the EXAMINER in charge of this application.

Thomas E. Robertson
Commissioner of Patents.

[Stamped]: MAILED DEC 4 1929

Applicant: J. T. Simmons
Ser. No. 87,323
Filed 2/9/26
For Method & apparatus for testing the productivity of formations encountered in wells

Mason & Mason
Wash. Loan & Trust Bldg.,
City

Additional references of record:

Halliday	1,474,630	Nov. 20, 1923	166/20
"	1,510,669	Oct. 7, 1924	"

In view of the fact that new references have been discovered which were not cited in the record nor considered by the Law Examiner inter partes this case has been reconsidered as follows:

Claims 1 and 2 are rejected as being met by Halliday 1,510,669 who shows a body 34, open at 42, a packer 6 carried by the body and a bushing 31 carried by the casing 3 and rotatable with respect to 34 having passages to register with those on 34.

Claims 26-36 and 37 are rejected as being completely met by Halliday. Attention of the applicant may be called to the fact that Halliday's device can be manipulated to close all the ports and further manipulated to open only the ports below the packers whereby the device can be used as a well tester.

Attention of the applicant is called to the fact that this rejection is in agreement with certain rulings of the law examiner who granted the motion with regard to count 10 of the interference as not being patentable over Cooper, even though Cooper's device is not a well tester.

Claims 3-7, 24 and (37) stand allowed.

The declaration of the new interference is postponed until one of the cases will be placed in condition for allowance.

[Written]: TK

C. F. Krafft

Examiner.

[Written]: 107 87 - 65

[Written]: #20 E.

10823

[Stamped]: APPLICATION DIV. DEC 15 16 1929 U. S. PATENT OFFICE

[Stamped]: U. S. Patent Office DEC 16 1929 DIVISION 38

IN THE UNITED STATES PATENT OFFICE

In re application of	:	
	:	
J. T. Simmons	:	
Serial No. 87,323,	:	Div. 38
	:	Room 145
Filed Feb. 9, 1926	:	
Method and Apparatus for testing the Productivity of Formations Encountered in Wells.	:	

Hon. Commissioner of Patents
Washington, D. C.

Sir:-

Please amend the above entitled application ~~as follows~~:-

Claims 1 and 2, at the end of these claims, change the period to a comma, and insert —said packer adapted to be postively pressed against the walls of the formation to seal off the same—.

√Claim 26, line 3, cancel "packing for sealing the well" and insert therefor —packer adapted to be positively pressed against the walls of the formation to seal off the same—.

Claim 27, line 3 after "pipe" first occurrence, insert —said packer adapted to be positively pressed against the walls of the formation to seal off the same—.

[In margin]: (E 1)

Claim 28, line 7, after "inlet" insert /√—said means consisting of a packer adapted to be positively pressed against the walls of the formation to seal off the same—.√

Claim 29, line 6, at the end of the claim, change the period to a comma, and insert —said packer being adapted to be positively pressed against the walls of the formation to seal off the same—.

[Written]: 87 - 66

√ Claim 30, line 5, after "pipe" first occurrence, insert —adapted to be positively pressed against the walls of the formation to seal off the same—.

Claim 31, line 6, after "tested" insert —said sealing means being adapted to be positively pressed against the walls of the formation to seal off the same—.

[In margin]: note TK

after

√ Claim 32, line 7, (before) "tested" insert —said packer adapted to be positively pressed against the walls of the formation to seal off the same—.

√ Claim 33, line 7 after "pipe" insert —said packer adapted to be positively pressed against the walls of the formation to seal off the same—.

[In margin]: Canceled Per Amd't D. M. & M. M. & M.

~~Claim 34, change the period to a comma at the end of the claim, and add —said packer adapted to be positively pressed against the walls of the formation to seal off the same—.~~

~~Claim 35, line 10, after "formation" insert —said packer adapted to be positively pressed against the walls of the formation to seal off the same—.~~

Claim 36, line 7, after "inlet" first occurrence, insert —said sealing means adapted to be positively pressed against the walls of the formation to seal off the same—.

Claim 38, line 9 after "formation" insert—said packer adapted to be positively pressed against the walls of the formation to seal off the same—.

REMARKS.

Claim 37 is understood to be allowed.

Applicant has been informed that the rejection of this claim in the Official action of Dec. 4th, 1929 was a typographical error. The third line from the bottom of the page in this Official action, states that claim 37 stands allowed.

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10825

The rejected claims have been amended pursuant to an interview with the Examiner having charge of this application. This has been done to facilitate the consideration of the case and to place the claims in better form. It is not admitted by applicant that the Halliday patents, cited in the last Official action; diclose the invention or meet the rejected claims. These patents both disclose means for cleaning out perforations in a well casing. The packing members in these devices act as pistons to move the liquid up and down in the well casing, as the pipe supporting the same is moved up and down. Both of these patents dis-

close two sets of pipes, and the apparatus cannot be used unless the string of pipes supporting the packer as well as the casing string be used. Referring to Halliday, No. 1,510,669, page 3, lines 8 to 20, it is stated that dogs 21

(which are mounted on the inner strong of pipe) engage perforations 2 as shown in Fig. 9. The perforations 2 are in outer casing 1. It will be apparent therefore, that in order to position the cleaner, it is necessary to anchor the cleaner, by having the dogs 21 which form part of the inner string of pipe, engage in perforations in the outer casing 1. It will also be apparent from an inspection of Halliday patent 1,474,630, that when the upper and lower sets of perforations 13 and 13′ are closed, that the perforations 13″ may be open for the purpose of allowing the cleaning fluid to be pumped down through the tubing string 16 and discharge through the ports 13′. It will be obvious that if this apparatus were used as a means for obtaining a sample, which function applicant's device is constructed to perform, that the fluids from the entire well would pass through the openings 2 in the casing and into the openings 13″. Similarly, if the openings 13″ were closed, fluids from the entire well would pass through the perforations 2 and into the openings 13 and 13′. In other words,

[Written]: 87 - 68

3

the packers in the Halliday patents are not constructed or arranged to seal off the formation at any place, nor could they be so used. A careful reading of the specifications of each of the Halliday patents discloses that the Halliday devices were constructed for the purpose of cleaning oil well casings, and for no other purpose.

Allowance of the claims is requested.

Respectfully submitted,

J. T. Simmons

By Mason & Mason,

Associate Attorneys.

Washington, D. C.
December 13, 1929

[Written]: 87 - 69

INTERFERENCE

Interference No. 59515 Paper No. 21

Name, John T. Simmons

Serial No. 87,323

Title, Method & apparatus for testing the productivity of formations encountered in wells

Filed, Feb. 10, 1926

Interference with Edwards, Charles R.

DECISIONS ON MOTION

Law Examiner, ... Dated, ...

Board of Appeals, ... Dated, ...

DECISIONS ON ~~PRIORITY~~ MOTIONS

(Priority) EXAMINER OF INTERFERENCES

~~Adverse~~	Vacated May 7/32. ~~Feb. 29/32~~
Ex'r of Interferences, Dissolved	Dated, June 24/30
Board of Appeals, Reversed	Dated, Feb. 17-1931
Court, ...	Dated, ...

REMARKS:

Ex'r of Intfs Decisions on Priority	Adverse (Dated) Dec. 21/32.	
"		
Board of Appeals.	Reversed	May. 16-1933

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

[Written]: 87 - 70

Div. 38 Room 145 Paper No. 22

COUNTS COMPARED

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name
kh/d

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

All communications respecting this
application should give the serial number,
and date of filing and name of
the applicant

[Stamped]: U. S. PATENT OFFICE INTERFERENCE DIV. JAN 30 1930 MAILED

[Written]: (Copy sent assignee.)

Please find below a communication from the EXAMINER in charge of this application

Thomas E. Robertson
Commissioner of Patents

Applicant: J. T. Simmons
Ser. No. 87,323
Filed 2/10/26
For Method & apparatus for testing the productivity of formations encountered in wells.

Mason & Mason

Wash. Loan & Trust Bldg;
Washington, D. C.

The case, above referred to, is forwarded to the Examiner of Interferences because it is adjudged to interfere with others, hereafter specified. The question of priority will be determined in conformity with the Rules. The interference will be identified as No. 59515 On or before MAR 10 1930 the statement demanded by rule 110 must be sealed up and filed with the subject of invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is

Count 1

A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well.

Count 2

Apparatus for testing a well comprising a string of pipe to be lowered into a well having an inlet at its lower end and carrying a packer adapted to be positively pressed against the walls of the formation to seal off the same above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

Count 3

Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer carried by the pipe said packer adapted to be positively pressed against the walls of the formation to seal off the same and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

Count 4

Apparatus for testing a well containing drilling fluid, which includes an empty string of pipe to be lowered in the well to adjacent the formation to be tested, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve for controlling the inlet, and means carried by the pipe for sealing the well above the inlet said means consisting of a packer adapted to be positively pressed against the walls of the formation to seal off the same, the valve

[Written]: 87-71

being positively controlled by movement of the pipe.

Count 5

Apparatus for testing a formation encountered in a well containing drilling fluid, which includes a single string of pipe to be lowered into the well to adjacent the formation to be tested, a valved inlet at the lower end of the pipe positively controlled from the top of the well by movement of the pipe and the packer carried by the pipe above the inlet, said packer being adapted to be positively pressed against the walls of the formation to seal off the same.

Count 6

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes an empty string of pipe to be lowered into the well to adjacent the formation to be tested, a packer carried by the pipe adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

Count 7

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested said ceiling means being adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

Count 8

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested said packer adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive fluid from formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary

part connected to the packer and a relatively movable part connected to the pipe.

Count 9

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the/formation to be tested, a packer carried by the pipe for sealing off the well above the formation an inlet below the packer opening into the pipe said packer adapted to be positively pressed against the walls of the formation to seal off the same, and a valve for the inlet, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

Count 10

Apparatus for testing a well containing drilling fluid, comprising a single string of pipe to be lowered into the well through the drilling fluid, said pipe being closed against the entrance of the drilling fluid, means at the lower end of the pipe

[Written]: 87-72

for receiving a sample including an inlet opening into the pipe, means carried by the pipe for sealing the well above the inlet said sealing means adapted to be positively pressed against the walls of the formation to seal off the same, and a valve for the inlet that may be positively opened and closed by movement of the pipe while the well is sealed above the inlet.

Count 11

A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of the fluid from the well, setting the packer above the formation and opening the valve to permit cognate fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample.

Count 12

An apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove the entrapped sample, said pipe being closed against the flow of the drilling fluid as the pipe is lowered into the well,

a packer carried by the pipe as the pipe is lowered into the well and adapted to be seated by manipulation of the pipe to seal off the well above the formation said packer adapted to be positively pressed against the walls of the formation to seal off the same, an inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the/packer is released and the pipe is being raised out of the well.

The interference involves your application above identified and an application for, Testing device for wells, filed by Charles R. Edwards whose post office address is 413 West 13th Avenue, Houston, Texas, whose attorney is Hardway & Cathey, 428 Bankers Mortgage Bldg; Houston, Texas.

The relation of the counts of this interference to the claims of the respective parties is as follows:

Counts	Edwards	Simmons
1	36	24
2	85	26
3	86	27
4	87	28
5	88	29
6	89	30
7	90	31
8	91	32
9	92	33
10	93	36
11	46	37
12	94	38

C. F. Krafft

Examiner, Div. 38.

[Written]: 87 - 73

Div. 38 Room 7510 Serial No. 87,323

Kh:WS

Address Only
The Commissioner of Patents
Washington, D. C.

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

September Thirteen, 1933

[In margin]: ☞ IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

[In margin]: ☞ UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

John T. Simmons (Assor)

Your APPLICATION for a patent for an IMPROVEMENT in Method and Apparatus for Testing the Productivity of Formations Encountered in Wells filed Feb. 10, 1926 has been examined and ALLOWED with 19 claims.

The final fee, THIRTY DOLLARS, WITH $1 AD-
)ITIONAL FOR EACH CLAIM ALLOWED IN EX-
CESS OF 20, must be paid not later than SIX MONTHS
rom the date of this present notice of allowance. If the
nal fee be not paid within that period, the patent will
e withheld, but the application may be renewed within
ne year after the date of the original notice with a re-
ewal fee of $30 and $1 additional for each claim in ex-
ess of 20.

The office delivers patents upon the day of their date,
n which date their term begins to run. The preparation
f the patent for final signing and sealing will require
bout four weeks, and such work will not be begun until
fter payment of the necessary final fee.

When the final fee is paid, there should also be sent,
)ISTINCTLY AND PLAINLY WRITTEN, the name
f the INVENTOR, TITLE OF THE INVENTION,
ND SERIAL NUMBER AS ABOVE GIVEN, DATE
)F ALLOWANCE (which is the date of this circular),
)ATE OF FILING, and, if assigned, the NAMES OF
HE ASSIGNEES.

If it is desired to have the patent issue to an AS-
IGNEE OR ASSIGNEES, an assignment containing a
REQUEST to that effect, together with the FEE for
ecording the same, must be filed in this office on or before
ne date of payment of the final fee.

After issue of the patent, uncertified copies of the drawings and specifications may be purchased at the price of TEN CENTS EACH. The money should accompany the order. Postage stamps will not be received.

The final fee will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

NOTICE.—WHEN THE NUMBER OF CLAIMS ALLOWED IS IN EXCESS OF 20, NO SUM LESS THAN $30 PLUS $1 ADDITIONAL FOR EACH CLAIM IN EXCESS OF TWENTY CAN BE ACCEPTED AS THE FINAL FEE.

Respectfully,

Conway P. Coe
~~Thomas E. Robertson~~
Commissioner of Patents.

Mason & Mason
Wash. Loan & Trust Bldg.
Washington, D. C.

[Written]: 87-74

SEP-19-33 49095 K — Check — 30.00

327

U. S. Patent Office

[Stamped]: MAIL. DIVISION SEP 19-33 U. S. PATENT OFFICE

FINAL FEE PAID TO THE COMMISSIONER OF PATENTS

(Be careful to give correct Serial No.)

[In margin]: 1 1 19 — 1√

Serial No. 87,323 √

INVENTOR:

John T. Simmons √

PATENT TO BE ISSUED TO

as of record

NAME OF INVENTION, AS ALLOWED:

Method & Ap. for Testing Productivity of Formations Encountered in Wells

DATE OF PAYMENT:

Sept. 18, 1933

FEE:

Thirty dollars

DATE OF FILING:

Feb. 10, 1926

DATE OF CIRCULAR OF ALLOWANCE:

Sept. 13, 1933 √

The Commissioner of Patents will please apply the accompanying fee as indicated above.

Lyon & Lyon
Attorneys.

SEND PATENT TO

Lyon & Lyon
National City Bank Bdg.
Los Angeles, Calif.

Final fees will not be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

[Written]: .87-75

(Patent)

[For copy of this patent 1,930,987, filed Feb. 10, 1926, see Plaintiffs' Exhibit 1 heretofore set forth.]

#23

[Stamped]: MAIL ROOM NOV 20 1933 U. S. PATENT OFFICE

DISTRICT COURT OF THE UNITED STATES
Southern District of California, Northern Division

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

In compliance with the Act of February 18, 1922 (42 Stat. L. 392), you are advised that there was filed on the 3rd day of November, 1933, in this court an action, suit, or proceeding No. D-56 Equity, entitled:

Name Erle P. Halliburton and Halliburton Oil Well Cementing Company, a corporation, Plaintiff,

Address a resident of Los Angeles and a corporation of Delaware, resp.

versus

Name Honolulu Oil Corp., Ltd. a corp and M. O. Johnston Oil Field Service Corporation, a corp, Defendant,

Address of corporation Delaware and California resp, place of business Kern County and Los Angeles County, Respectively,

brought upon the following patents:

Patent No.	Date of Patent	Patentee
1 1930987	Oct. 17, 1933	Erle P. Halliburton
2		
3		
4		
5		

In the above-entitled case, on the .... day of ...., 192 , the following patents have been included by .... (insert amendment, answer, cross bill, or other pleading):

Patent No.	Date of Patent	Patentee
1		
2		
3		
4		
5		

In the above-entitled case the following decision has been rendered or decree issued:

....

....

IN WITNESS WHEREOF I have affixed my hand this 16th day of November, 1933, at Los Angeles, California

R. S. Zimmerman,
Clerk of said Court.

Francis E. Cross
Francis E Cross

[Written]: 87-76
#24.

[Stamped]: MAIL DIVISION JAN 19-34 U. S. PATENT OFFICE

[Stamped]: DOCKET DIVISION JAN 19 1934 U. S. PATENT OFFICE

IN THE UNITED STATES PATENT OFFICE
DIVISION 38, ROOM 7510

Houston Texas, Jan. 3, 1934.

In re patent No. 1,930,987,
Issued to John T, Simmons,
and to Erle P. Halliburton,
On Oct. 17, 1933, on
Application No. 87,323,
Filed Feb. 10, 1926,
For "A method and Apparatus
for Testing the Productivity
of Formations Encountered in Wells."
Commissioner of Patents,
Washington, D. C.

Sir:–

So that the proper notices may be entered on the file wrapper of the above patent application this is to inform you that under the provissions of the United States Revised Statutes Sec. 4915 (35 U. S. C. A. 63) suits were filed as follows to authorize the issuance of Letters Patent involving application Serial No. 301,762 and Patent No. 1,930,987, that in each case Charles R. Edwards is the

plaintiff and that in each case the defendants are (1) John T. Simmons, (2) Erle P. Halliburton and (3) Halliburton Oil Well Cementing Company:

December 20, 1933, Equity 671 in United States District Court, Tyler Division, Eastern District of Texas, at Tyler,

and on:

December 21, 1933, Equity No. 134-C, in United States District Court, Central Division, Southern District of California, at Los Angeles, Cali.,

and on

December 22, 1933, Equity No. 56,598, in the Supreme Court of the District of Columbia, Washington, D. C.

That these suits are a continuation of Patent Office Interference No. 59,515, Edwards vs Simmons.

Please acknowledge receipt of this notice and accept in advance my thanks for the same.

Very respectfully,

Charles R Edwards
plaintiff and applicant

Box 7334

[Written]: 87 - 77

#25

[Stamped]: MAIL ROOM DEC 27 1933 U. S. PATENT OFFICE

DISTRICT COURT OF THE UNITED STATES
Southern District of California

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

In compliance with the Act of February 18, 1922 (42 Stat. L. 392), you are advised that there was filed on the 21st day of December, 1933, 192 , in this court an action, suit, or proceeding No. 134 C. Eq., entitled:

Name Charles R. Edwards, Plaintiff,

Address Houston, Texas

versus

Name John T. Simmons, Erle P. Halliburton and Halliburton Oil Well Cementing Company a corporation, Defendant,

Address Simmons is of Texas; Halliburton and Halliburton Oil Well Cementing Co. are of Los Angeles Calif and Duncan Okla respectively,

brought upon the following patents:

Patent No.	Date of Patent	Patentee
301762	....	Charles R. Edwa
1 1930987	Oct. 17, 1933	John T. Simmon
2..................	....	....
3..................	....	....
4..................	....	....
5..................	....	....

In the above-entitled case, on the ....
of ...., 192 , the following pat
have been included by .... (in
amendment, answer, cross bill, or other pleading):

Patent No.	Date of Patent	Patentee
1..................	....	....
2..................	....	....
3..................	....	....
4..................	....	....
5..................	....	....

In the above-entitled case the following decision has b
rendered or decree issued:

....

....

IN WITNESS WHEREOF I have affixed my h
this 23rd day of December, 1933, 192 , at Los Ange
California,

R. S. Zimmerman,
Clerk of said Cour

Francis E. Cross
Francis E. Cross

[Written]: 87 - 7

[Stamped]: MAIL ROOM JAN 31 1934 U. S. PATENT OFFICE

DISTRICT COURT OF THE UNITED STATES
Eastern District of Texas

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

In compliance with the Act of February 18, 1922 (42 Stat. L. 392), you are advised that there was filed on the 20th day of December, 1933, in this court an action, suit, or proceeding No. 671, entitled:

Name Charles R. Edwards, Plaintiff,

Address 413 West 13th Ave., Houston, Texas

versus

Name John T. Simmons, Southern Hotel, Longview, Texas,

Erle P. Halliburton, 810 S. Spring St., Los Angeles, California

Halliburton Oil Well Cementing Co., a corp., Duncan, Okla. Defendant,

Address ....

brought upon the following patents:

Patent No.	Date of Patent	Patentee
1 301,762 – application filed Aug. 24, 1928 by		Charles R. Edwards
2 1,930,987	Oct. 17, 1933	John T. Simmons, assigned to Erle P. Halliburton.
3........................	....	
4........................	....	
5........................	....	....

In the above-entitled case, on the........day of.................., 1934, the following patents have been included by.............. (insert amendment, answer, cross bill, or other pleading):

Patent No.	Date of Patent	Patentee
1........................	....	....
2........................	....	....
3........................	....	....
4........................	....	....
5........................	....	....

In the above-entitled case the following decision has been rendered or decree issue:

....

....

IN WITNESS WHEREOF I have affixed my hand this 29th day of January, 1934, at Tyler, Texas

F. A. King
Clerk of said Court.

87 — 79

#27

[Stamped]: Mail Room Jan 31 1934 U. S. Patent Office

DISTRICT COURT OF THE UNITED STATES
Eastern District of Texas, Tyler Division

Honorable Commiissioner of Patents,
Washington, D. C.

Sir:

In compliance with the Act of February 18, 1922 (42 Stat. L. 392), you are advised that there was filed on the 25th day of January, 1934, in this court an action, suit, or proceeding No. 693, entitled:

Name Erle P. Halliburton and Halliburton Oil Well Cementing Co., a corp., Plaintiff,

Address Los Angeles, Calif. —Delaware Corp.

versus

Name Johnston Formation Testing Corp., a corp. and E. C. Johnston, Defendant,

Address Delaware Corp., — E. C. Johnston, Pres. resides Longview, Texas

brought upon the following patents:

Patent No.	Date of Patent	Patentee
1 1930987	Oct. 17, 1933	Erle P. Halliburton
2		
3		
4		
5		

In the above-entitled case, on the........day of.................. 193 , the following patents have been included by.......... (insert amendment, answer, cross bill, or other pleading):

Patent No.	Date of Patent	Patentee
1		
2		
3		
4		
5		

In the above-entitled case the following decision has been rendered or decree issued:

....

....

IN WITNESS WHEREOF I have affixed my hand this 29th day of January, 1934, at Tyler, Texas

F. A. King
Clerk of said Court.

87 — 80

#28

[Stamped]: Mail Room Mar 28 1934 U. S. Patent Office

DISTRICT COURT OF THE UNITED STATES
Southern District of California, Central Division

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

In compliance with the Act of February 18, 1922 (42 Stat. L. 392), you are advised that there was filed on the 12th day of March, 1934, ~~192~~ , in this court an action, suit, or proceeding No. 199-H Equity, entitled:

Name Erle P. Halliburton and Halliburton Oil Well Cementing Company, a corp., Plaintiff,

Address Los Angeles, Calif.

versus

Name W. D. Shaffer, doing business under the firm name and style of Shaffer Tool Works and M. L. Boles Defendant,

Address Brea, Calif. Whittier, Calif.

brought upon the following patents:

Patent No.	Date of Patent	Patentee
1 1,930,987	10/17/33	Erle P. Halliburton
2	....	....
3	....	....
4	....	....
5	....	....

In the above-entitled case, on the........day of.................., 192 , the following patents have been included by.......... (insert amendment, answer, cross bill, or other pleading):

Patent No.	Date of Patent	Patentee
1	....	....
2	....	....
3	....	....
4	....	....
5	....	....

In the above-entitled case the following decision has been rendered or decree issued:

....

....

IN WITNESS WHEREOF I have affixed my hand this 24th day of March, 1934, ~~192~~, at Los Angeles, California

R. S. ZIMMERMAN
Clerk of said Court.

M. R. Winchell
By M. R. Winchell
Deputy Clerk.

87 — 81

TITLE REPORT

No. 1,930,987.

Name J. T. Simmons

The title appears from the assignment records to be vested in:

Erle P. Halliburton, Los Angeles, Calif.
(no street address given)

Examined up to and including 9/4/34

This certificate dated 9/13/34

C. H. Gray

h Chief of Assignment Division.

No further assignments appear to have been received for record including 9/10/34

87 — 82

[Stamped]: Mailed Oct 23 1934

Div. 38 Room 5086 213 Paper No. 29

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name
kh/d

All communications respecting this application should give the serial number, date of filing, and name of the applicant

DEPARTMENT OF COMMERCE
United States Patent Office
Washington

Please find below a communication from the EXAMINER in charge of this application
~~Thomas E. Robertson~~

Conway P. Coe
Commissioner of Patents

Applicant: John T. Simmons
Ser. No.:....87,323
Filed............Feb. 10, 1926
For:..............Well testing devices
Patented Oct. 17, 1933
Patent #1,930,987

Mason and Mason
Washington Loan and Trust Building,
Washington, D. C.

The case, above referred to, is forwarded to the Examiner of Interferences because it is adjudged to interfere with others, hereafter specified. The question of priority will be determined in conformity with the Rules. The

interference will be identified as No. 69519 On or before Dec 3 1934 the statement demanded by rule 110 must be sealed up and filed with the subject of invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is

Count 1

A well testing device comprising a body part having a lower pin projecting therefrom and forming a shoulder with the body part, a downwardly tapering packer surrounding said pin for engaging against said shoulder, and means at the lower end of said pin for constituting an abutment for said packer, said body part and pin having a passage therethrough, and means adjoining the upper end of said body part for opening and closing the communication of this passage with the casing above.

Count 2

A well testing device comprising a body part having a pin extending from the lower part thereof, said body part and pin having a passage therethrough, a packer extending about said pin; an adjusting sleeve on the lower end of said pin, a perforated pipe secured to the lower end of said sleeve, and means above the body part for regulating the communication of the passage with the interior of the casing above.

The interference involves your patent above identified and an application for Apparatus for obtaining samples from drilled wells filed by George A. Macready whose post office address is 5425 Chesley Avenue, Los Angeles, California.

The relation of the counts of the interference to the claims of the respective parties is as follows:

87—83

Counts	Macready.	Simmons
1	9	6
2	10	7

C. F. Krafft
Examiner

FK

87 — 84

INTERFERENCE

Interference No. 69519 Paper No. 30

Name, John T Simmons

Serial No. 87,323 Patent #1,930,987

Title, Well testing devices

Filed, Feb. 10, 1926 Patented Oct. 17, 1933

Interference with G. A. Macready

....

....

DECISIONS ON MOTION

Ex'r of Interferences, ... Dated, ...

Board of Appeals, ... Dated, ...

DECISIONS ON PRIORITY

Ex'r of Interferences, ... Dated, ...

Board of Appeals, ... Dated, ...

Court, ... Dated, ...

REMARKS:

....

....

....

....

....

....

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

87—85

~~2—121~~

1926

CONTENTS:

29. Intf Letter Oct 23 1934
30. Intf Memo.
31. ....
32. ....
33. ....
34. ....
35. ....
36. ....
37. ....
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[Stamped]: U. S. Patent Office Feb 13 1926 Division 38
87323 86

[Stamped on back]: Assembled by M.H. Revised by........
Letter No. 135617 Date 10/28/35

No. D-56-Eq. Halliburton, et al. vs. Honolulu Oil Corp. Plfs. Exhibit No. 2. Filed 11/11 1935 R. S. ZIMMERMAN, Clerk by Cross Deputy Clerk.

[PLAINTIFFS' EXHIBIT No. 3.]

390

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of Papers 40, 114, and 119; and Pages 1, 2 and 4 of Index, in the matter of

Interference Number 59,515,
Edwards vs. Simmons,
Subject Matter:–
Testing Device for Wells.

In Testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this twenty-ninth day of October, in the year of our Lord one thousand nine hundred and thirty-five and of the Independence of the United States of America the one hundred and sixtieth.

[Seal]

Conway P. Coe
Commissioner of Patents.

Attest:
C. W. Sutton
Acting Chief of Division.

[Stamped on face]: U. S. Patent Office Board of Appeals Feb 17 1931 Mailed.

Appeal No. 286-287 Paper No 40

Decision.

Appeal No. 286-287 OVT

Hearing:

January 27, 1931

IN THE UNITED STATES PATENT OFFICE

BEFORE THE BOARD OF APPEALS

Edwards vs. Simmons

Patent Interference No. 59,515 between an application of Charles R. Edwards filed August 24, 1928, Serial No. 301,762; and an application of John T. Simmons filed February 10, 1926, Serial No. 87,323. Testing Device for Wells.

Messrs. Hardway & Cathey and Messrs. Foster & Codier for Edwards.

Messrs. Lyon & Lyon and Messrs. Mason & Mason for Simmons.

MOTION TO DISSOLVE

This is an appeal by the party Simmons from the decision by the Examiner of Interferences on a motion to dissolve holding all of the counts 1-12 inclusive unpatentable.

The party Edwards has also appealed from so much of the decision of the Examiner of Interferences which relates to Simmons' right to make count 2. The Examiner of Interferences held that Simmons could make the count and hence this question is not appealable. The appeal of the party Edwards will therefore be dismissed.

59515 1

Counts 1 and 3 are reproduced below:

1. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well.

3. Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer carried by the pipe said packer adapted to be positively pressed against the walls of the formation to seal off the same and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

The references relied upon are:

Franklin	263,330	Aug. 29, 1882
Edwards	1,514,585	Nov. 4, 1924
Macready	1,522,197	Jan. 6, 1925
Macready	1,776,918	Sep. 30, 1930

The invention relates to a method and apparatus for testing an oil well. The method comprises lowering a string of pipe carrying a packer through the drilling fluid to the oil formation, setting the packer to seal off the entrance of drilling fluid from above to the formation, opening an inlet valve to the pipe to admit oil, closing the inlet valve from entrance of drilling fluid and then raising the pipe with the entrapped sample.

In holding counts 1 and 11 covering methods unpatentable, the Examiner of Interferences relies on the Edwards patent No. 1,514,585. This patent describes fully how the patentee contemplated using his device for testing. The

59515 2

drill pipe 1 with the nipple 4 and the perforated lower end attached to the packer 5 is first lowered to the bottom of the well; then the test stem 8 together with the sleeve 7 is lowered to a point above the seat 6 and water is pumped down through the pipe 1 past the stem 8 and seat 6 to below the packer to wash out the stratum to be tested. The packer 5 is then raised, tripped and set. The test stem 8 is then seated on the seat 6 and the slush pump started pumping in mud down the pipe 1 out through the perforations 10 in the pipe 1 and up to maintain the wall. After a while the stem 8 is turned to the right to unscrew it from the sleeve 7 and the stem 8 is lowered. The oil below the packer 5 will now pass through the perforations in the stem 8 and rise up in the stem and pass out at the top if there is sufficient pressure. If there is not sufficient pressure a pump may be used to pump it out, thus completely testing the stratum.

The last paragraph of the specification states: "To withdraw the apparatus the packer is first released before stopping the slush pump and the test stem is then withdrawn before withdrawing the drill pipe and packer."

It is clear that the patent specification does not describe the same method of testing as covered by counts 1 and 11. Count 11 calls for the insertion of a single string of pipe which is a material limitation and cannot be disregarded. The Edwards patent clearly contemplates the use of two strings of pipe. The difficulty of manipulation and loss of time incident thereto in making a test with two strings of pipe as compared with testing with a single string is so obvious that the distinction is a material

one. Count 1 includes "closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and packer from the well." Count 11 contains a similar limitation. The patent does not describe such operation of closing the valve and raising the pipe to remove an entrapped sample. Nowhere in the patent is there any indication of entrapping a sample and raising the pipe so the sample can be examined. If the packer 5 in the patent is released as stated in the specification while the stem 8 is down the drilling fluid would immediately enter the stem 8 through the perforations and contaminate the oil sample. The patent contemplates a different method of operation and in carrying it out both of the pipes 1 and 8 are essential and the pipe 1 must carry a packer. We do not believe it proper to take a portion of the device such as the stem 8 and sleeve 7 and exclude other essential parts and try to make out an anticipation for the counts when the patent states nothing about such a mode of operation. It is also doubtful that the parts 7 and 8 could be used to carry out the methods recited by the counts, and considerable modification of them would be required which would involve invention. Unless the sleeve 7 was constructed so as to pack, and unless the stem 8 could be maintained closed during the raising of the stem, no accurate entrapped sample could be obtained. When the pressure of the drilling fluid is large the fluid would evidently enter the stem 8 unless the stem could be screwed back into the sleeve 7. There is no disclosure of this in the patent.

The apparatus claims 2-10 and 12 have been held unpatentable in view of the disclosure in the Franklin patent considered in connection with Macready. The Franklin patent discloses a device for regulating or controlling the flow of oil wells. It consists of a valve structure shown in Figs. 1 and 2 which is intended to be atached to the tubing of the well preferably above the packer. When the tubing is placed in the well or is withdrawn from it the valve disk may be closed by turning the upper part of the tubing and thus prevent flowing of oil. The Examiner of Interferences holds that the lower part of the valve structure, namely part B, could be used as a packer to fit in a rat hole in view of Macready 1,522,197 and thus anticipate these counts. We are unable to take this view. The Franklin patent was not designed to have the part B serve the function of a packer. The part B happens to be somewhat tapered but otherwise there is no suggestion that it could be used as a packer. Nor do we think that the Macready patent would supply what the Franklin patent lacks. We have noted the statements concerning the Franklin patent made by Judge Hutcheson in his decision involving the Edwards patent. However, the general statement made that the device of Franklin could be modified to be used as a tester gives no clue as to what modifications were contemplated.

The Macready patent discloses the use of a packer on a tester. This is admittedly old not only in this patent but in many other patents in the record. But we do not believe that these patents suggest how the Franklin structure

can be modified to meet these counts. The Franklin structure was devised years before any packers were used and it was never intended to function as a tester when it was constructed.

The brief of the party Edwards lays stress upon the limited original disclosure of Simmons and urges that in view of it the counts do not define anything patentable over the references. The Examiner of Interferences held that Simmons could make the counts so that seems to remove this objection.

The appeal of the party Edwards is dismissed.

The decision of the Examiner of Interferences is reversed.

Wm. A. Kinnon)
First Assistant Commissioner)
)
W. L. Redrow) BOARD
Examiner-in-Chief) OF
) APPEALS
R. Elmburg)
Examiner-in-Chief)
)

February 17, 1931

[Stamped on face]: U. S. Patent Office Board of Appeals May 16 1933 Mailed.

8322

Appeal No. 8422 Paper No. 114

Decision

Appeals Nos. 8322-8422 MCV

Hearing:
April 28, 1933.

IN THE UNITED STATES PATENT OFFICE

BEFORE THE BOARD OF APPEALS

Edwards v. Simmons

Patent Interference No. 59,515 between the applications of Charles R. Edwards filed Aug 24, 1928, Serial No. 301,762 and John T. Simmons filed February 10, 1926, Serial No. 87,323. Testing Device for Wells.

Messrs. Hardway & Cathey, Messrs. Foster & Codier, and Messrs. Jesse R. Stone and Lester B. Clark for Edwards.

Messrs. Lyon & Lyon and Messrs. Mason & Mason for Simmons.

This is an appeal by the party Simmons from the decision of the Examiner of Interferences awarding priority of invention to Edwards of all the counts.

The subject matter in controverwsy relates to devices for testing oil wells and the purpose of such testers is to ascertain whether there exists in a predetermined portion of the formation a sufficient quantity of oil or gas so that production would be practicable.

There are twelve counts. Counts 3 and 11 may be taken as representative and read as follows:

> 3. Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer carried by the pipe said packer adapted to be positively pressed against the walls of the formation to seal off the same and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

59515 7

SHEET NO. 2 #8322-8422

> 11. A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognate

fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample.

The examiner of interferences awarded priority to the junior party Edwards on the ground that Simmons had derived the invention from Edwards and was not therefore an original inventor.

The party Edwards testified that he conceived the invention in 1917 while being employed at the International Marine Iron Works in Houston, Texas. A sketch was made of the invention on some object in the shop and shown to a visitor. A sketch was also later made in a note-book, Exhibit 33, and a vest pocket model, Exhibit 7, was constructed. Edwards testifies that sometime later he explained the invention to George Watkin, who pointed out the danger of the device becoming stuck in a well. During the strike of the machinists in the shop in 1918 and the early part of 1919, Edwards states, he made a tool embodying the issue and showed it to George Watkin, Mrs. Watkin and Mrs. Edwards. The tool was taken to Edwards' home and was reassembled. Edwards testifies that he later became shop superintendent for the Mack Manufacturing Company and during the latter part of 1919 or early part of 1920 he interested a party in making a test of the tool in an oil well near Humble, Texas. In 1920, Edwards states, he explained the tester and sketches of it to Simmons, the senior party of this interference. In the fall of 1921 or spring of 1922 a drawing, Ex-

hibit 1, was shown to Seth Evans and he was asked to make a drawing of it that would be somewhat in perspective for advertising purposes. In the early part of 1922 Edwards again met Simmons at Shreveport, and discussed the single string tester with him as well as a double string tester. In discussing the form of packer used Edwards told him about a wood plug packer that could be stripped off of the tool.

The witness Seth Evans coroborates Edwards as to this early activity. Evans, who is an engineer with the Hughes Tool Company, was associated with the Mack Manufacturing Company part of 1920, 1921 and 1922. He testifies that during 1921 Edwards showed him a sketch or drawing that he or some one else had made. He requested Evans to make a more refined drawing which he could use as a basis for a cut to be used in a pamphlet for advertising purposes. Evans describes the tester as follows:

> Q. 14 The question was Mr. Evans state the details of the construction of this tester?
>
> A. The main features of the device comprised a central member which was to be attached to the drill stem and on which was to be carried an annular member on which was mounted a packer, this said annular member was arranged so that it together with the packer could be set into a rat hole so called at the bottom of an oil well, which would then seal off the rat hole from the upper portion of the oil well after which the main or inner member could be

rotated and would release from the outer member and allowing the inner member to be lowered somewhat into the rat hole unclosing openings which would allow the fluid in the rat hole to flow through the inner member into the drill stem and could then either be pumped or would flow under the hydrostatic head of the formation and would then flow to the surface where it could be analyzed for oil contents.

Evans testifies that he is not absolutely certain that Exhibit 1 is the identical drawing given him by Edwards but believes it is the same. He recollects that the details shown on the drawing were the same or very similar to the details of Exhibit 1.

59515 9

SHEET NO. 4 #8322-8422

The Examiner of Interferences found that the testimony of Evans was sufficient to furnish corroboration of possession by Edwards of the invention in issue in 1921. We believe that this finding is correct.

In April and May of 1922 a suit for the receivership of the Mack Manufacturing Company was brought and

a receiver was appointed in September, 1922. In 1924 the Houston Engineers, Inc., was organized by Edwards, Tracy T. Word and Charles W. Markle. The purpose of this company was to exploit Edwards' inventions. After organizing this company threats of suits by the stockholders of the Mack Manufacturing Company were made and in December, 1924 a judgment was obtained against Mack and Edwards. In the latter part of 1924 Edwards states he disclosed the well tester to Mr. Halliburton, the assignee of the Simmons present application (Edwards, page 364, Q. 165). The date is fixed by reference to a letter, Exhibit 36, written to the General Electric Company regarding an automatic drilling device (Edwards, page 365, Q. 167). During the years 1925 and 1926, Edwards testifies, he was working constantly on an educational campaign to teach the public the use of well testers (Edwards, page 379, Q 195). Edwards made many trips through the oil fields and used the vest pocket model, Exhibit 7, to interest the trade in oil well testers. Edwards had obtained a patent on a two-string tester in 1924, patent No. 1,514,585, and he states that he believed his patent covered also a single string tester. In June 15, 1925 an advertisement, Simmons Exhibit 5, disclosing a two string tester was inserted in the Oil Weekly of June 15, 1925. Another advertisement of a two string tester was inserted in the Oil Weekly October 2, 1925. Circulars, Edwards Exhibits 2, 5 and 6, were mailed to various

59515 10

rties in the fall of 1925. The drawing, Exhibit 1, was closed to Mrs. Sell, Mrs. Henry, Mrs. Acebo and Mrs. ormant in the summer of 1925. In October, 1925 lwards states he had a conversation with Halliburton l the latter offered to ~~purchase his patent No. 514,585~~ l any improvement he might make. During the years 25 and 1926, Edwards and his associates Word and arkle testify, they refrained from actual construction a testing tool because of the threatened litigation by ack and the stockholders of the Mack Manufacturing mpany. A decision denying Mack the right to the entions of Edwards was handed down June 27, 1927. tester was ready for operation on July 1, 1927 and ted. The test is corroborated by the witness Hewit o actually used the tester on that date.

Simmons filed his application on February 10, 1926. e do not find from the evidence that Edwards reduced invention to practice prior to this date, nor did the aminer of interferences so find. The test alleged to ve been made in the Humble oil field in 1919-1920 is corroborated. The filing of the application upon ich patent No. 1,514,585 was granted cannot be relied on for constructive reduction to practice because the ent does not disclose the invention of the counts.

The party Simmons stands on his filing date, February 1926. At a time just prior to this date Edwards was diligent in reducing his invention to practice. From evidence produced Edwards was not in such financial cumstances that he was unable to pay for filing the plication. The excuse offered because of the threatened ts by the stockholders of the Mack Manufacturing mpany is also deemed insufficient. The examiner of erferences did not consider it necessary to decide ether Edwards was diligent because he found

59515 11

that Simmons had derived his invention from Edwards and was therefore not an original inventor. The question of originality will therefore be considered.

Edwards testified that he discussed the invention with Simmons in 1920 and 1922.

Q. 155. Have you ever talked with John T. Simmons about the formation tester involved in this interference?

A. I have.

Q. 156. When was this?

A. The first time I talked with Mr. Simmons was at the old Mack Mfg. Co. plant in Houston, Texas, along in the year 1920. Mr. Simmons came to the plant and we got into discussion about oil field improvements, and I showed him some sketches that I then had of well testers. Mr. Simmons explained to me that had had considerable experience in well drilling. That he had drilled some over at Batson and I believe he told me also in Louisiana. And in our conversation we took up the discussion of well testers. I explained—

BY MR. CLARK: Interrupting the witness—

Q. 157. Have you ever talked with Mr. Simmons about this tester since 1920?

A. I talked with Mr. Simmons—Yes.

Q. 158. Where was this later conversation?

A. Over at Shreveport, La.

Q. 159. When was this conversation at Shreveport,

A. It was in the early part of the year 1922.

Q. 160. Were any specific types of testers discussed?

A. Yes, sir.

Q. 161. Will you please explain what types were discussed?

A. We discussed both the double string and the single string tester and talked about the trouble there would be without circulation. We also in the first conversation talked about the form of valve. I told him that I had tested out under pressure at the old International Marine Iron Works a Cleco valve and told him that I had found that the pressure I put upon the valve with a boiler test pump prevented the valve from working. In the latter discussion at Shreveport we discussed the form of packer among other things and I told him about a wood plug packer that could be stripped off of the tool and that by rotating the stem we would be able to know when there was any danger of sticking and that because of turning the stem I did not believe there would be so much danger of sticking.

Rebuttal testimony was taken on the question of ginality and Simmons, when confronted with Edwards, ified as follows:

59515 · 12

Q. 6. Will you please stand up and look at the gentleman who has just come in and after taking a good look at him as long as you want to, please state whether you are acquainted with that gentleman?

A. I am not acquainted with him.

Q. 7. Please state whether to your knowledge you have ever seen the party Edwards before you saw him just now.

A. Not in my life that I remember of.

Q. 8. Are you the John T. Simmons who filed application Serial No. 87323 filed on or about February 9, 1926, which is involved in this interference?

A. Yes.

By Mr. Richmond: Let the record show that just prior to the asking of Question 6, that the party Charles R. Edwards entered the room where this deposition is being taken.

Q. 9. Did you ever work or drill or work at the drilling of a well or wells in the Batson Oil Field in the State of Texas?

A. No.

Q. 10. Were you ever in the Batson Oil Field, and if so, when and for how long a period of time?

A. I was in Batson one time, one day and one night, in the year 1902 or '03, and at no other time.

Q. 11. Where did you reside during the year 1920, if you remember?

A. On Tarkington's Prairie, Liberty County, Texas.

Q. 12. What business or occupation did you follow during your residence at Tarkington's Prairie in 1920?

A. I was working with cattle; in the cattle business.

Q. 13. During your residence there, were you engaged in any capacity or interested in the production or drilling for oil?

A. The best I remember I was not.

Q. 14. During the year 1920 did you know of, or were you acquainted with a manufacturing company in Houston, Texas, known as the Mack Manufacturing Company?

A. No.

Q. 15. Do you know of your own knowledge whether there was ever a company in the City of Houston, Texas, engaged in the manufacture of oil well tools and equipment and known as the Mack Manufacturing Company?

A. No, not that I remember of.

Q. 16. Did you during the year 1920 at the place of business of the Mack Manufacturing Company in Houston, Texas, discuss with the party Edwards or with any one else oil well testers, either double string or single string testers?

A. No.

Q. 17. Where did you reside during the year 1922, if you remember?

A. In Shreveport, La., most of the year.

Q. 18. In what business or occupation were you engaged during your residence in Shreveport, La., in the year 1922?

A. In the furniture business.

59515 13

Q. 19. State where that furniture business was located, if you remember.

A. 113 Texas Avenue, Shreveport, La.

Q. 20. State whether in the early part of the year 1922, or at any time during that year of 1922, you had a conversation with the party Edwards concerning well testing devices, either of the two string or one string or both.

A. I did not.

Q. 21. State whether you have at any time or at any place or under any circumstances ever discussed well testers with the party Charles R. Edwards.

A. Not that I ever remember of.

Q. 22. State whether prior to on or about the 9th day of February, 1926, you ever at any time or at any place discussed well testers of any kind or description with the party Charles R. Edwards.

A. No.

Rebuttal testimony was later taken by Edwards and the witnesses J. D. Pace and R. L. Mayfield were produced. Edwards testified that the Mack Manufacturing Company received the letter, Exhibit B on February 6, 1922 from the Acme Oil and Drill Company of Shreveport, La., and that he came to Shreveport some time later. As he went into the store of the company he met John T. Sim-

mons and they discussed several inventions. In describing the disclosure of the well tester Edwards states:

> I explained at this conversation the well tester, among a number of other inventions that I had and he seemed very much interested in the well tester, his only objection being that it was liable to stick. I explained about the packer—how it could be pulled off and about how I could rotate while making the test so that if cavings did start to fall in the drill stem would slow up in its rotation and he could immediately pull out. I explained the device in detail, using the little model Edwards Exhibit No. 7, and also one or more sketches at that time. I explained all the details of it and told him when he pointed out about sticking of the drill stem that if it had to be I could use the outside string of pipe—that is the two string tester—and circulate. Mr. Pace was present during part of this conversation, which lasted for perhaps thirty minutes or longer.

The witness Pace testified that he had been engaged in the oil business since 1903, and that during the year 1922 he operated an oil well supply store at Shreveport, La., under the name of Acme Oil and Drilling Company, Inc. He testifies that

he has known Edwards since 1920 and Simmons since 1922. He testifies that Edwards and Simmons had a conversation in his store in 1922 as follows in answer to question 14:

> They were in my place of business and Mr. Edwards was showing a little model that he claimed to be an oil tester. Mr. Edwards handed me this little brass trick. I was looking at it and this Slim Simmons was there which all three of us joined in inspecting this little model, about that time I was called away to answer the phone or something and I laid this little model on the hay shelf and when I returned Mr. Simmons had this little model and Mr. Edwards was explaining it to him. Of course, in explaining anything of that kind there was quite a bit of talking, which always goes with new inventions.

Pace made a sketch, Exhibit A, of the model which Edwards had with him. In regard to this tester model Pace testified further:

> Q. 33. Do you recall anything that Simmons said on the time that he, you and Mr. Edwards were examining and discussing the oil well tester model? And if you do remember give the substance of what he said.

A. Well, there was quite a lot of talk, you know, between all three of us at which time Mr. Simmons remarked that if it would test the oil why it would be a very valuable tool in the oil business. I remarked that it would be a humdinger and I would like to own it myself. Of course, I being called away so often I left Edwards and Slim still talking about the model and of course I could not tell what all they said about it.

The witness Mayfield testified that he was a public accountant and secretary-treasurer of the Acme Oil and Drill Company in 1922; that his headquarters was the Acme Oil and Drill Company on Milam street, Shreveport, La.; that he knew Edwards and a man by the name of Slim Simmons in 1922. He also testifies that Slim Simmons came into the store three or four times during 1922, and endeavored to get Mr. Pace to handle a pulling tool that he had.

From the testimony produced we are unable to find that it establishes derivation of the invention by Simmons from Edwards. The witness Pace did not hear more than a part of the.

59515 15

conversation between Edwards and Simmons. The sketch which Pace made of the model alleged to have been in Edwards' possession does not show all the essential elements of the invention as recited by the apparatus counts. The additional description of the model and its mode of operation set forth in questions 41 to 44 is not regarded sufficient to show a disclosure of the invention by Edwards to Simmons.

It may also be noted that Pace was a man of seventy-one years of age when he testified. The testimony was given ten years after the alleged conversation took place. It is highly improbable that Pace could, under the circumstances, give any clear description of what Edwards is alleged to have disclosed to Simmons.

The point has been raised by the party Simmons that Edwards failed to prove that the Slim Simmons to whom Edwards alleges he disclosed the invention in issue in 1922 is the same party as John T. Simmons of the present interference. It was pointed out above that John T. Simmons denied that he had ever met Edwards. Neither Pace nor Mayfield has identified Simmons as he was not present when they testified. Effort was made by Edwards to locate him and the counsel for Simmons was called upon to produce him when the testimony was taken. A chain of circumstances is pointed to on pages 7 and 19 of Edwards' brief which counsel for Edwards urges clearly demonstrates that "Slim Simmons" was the same party as John T. Simmons of the present interference. We are not satisfied that this is adequately proven. The party Simmons was produced by his counsel when he took rebuttal testimony and Edwards did not then bring forward any witnesses to identify him as being the Slim Simmons he met in 1922. When Edwards took further testimony later on, Simmons could not be located.

59515 16

The party Simmons moved to strike all the testimony of Pace and Mayfield and so much of Edwards' as relates to alleged conversations between the parties Edwards and Simmons which took place in the presence of Mayfield and Pace. It is urged that the testimony is not proper rebuttal and is inadmissible. We believe that this testimony was properly received for reasons stated by the examiner of interferences on page 6 of his decision.

We find from the testimony that Edwards conceived the invention in 1921 but did not reduce the invention to practice prior to Simmons' filing date. We find that Edwards was not diligent in reducing the invention to practice just prior to Simmons' filing date. We find that derivation by Simmons of the invention in issue from Edwards has not been proven.

The decision of the examiner of interferences awarding priority to Edwards is accordingly reversed. Priority is awarded to John T. Simmons, the senior party.

Wm A Kinnon	)	
First Assistant Commissioner	)	
	)	
W. L. Redrow	)	Board
Examiner-in-Chief	)	of
	)	Appeals
T. P. Edinburg	)	
Examiner-in-Chief	)	
	)	

May 16, 1933

59515 17

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Appeal No. 8322 Paper No. 119
8422

Decision

Appeal Nos. 8322-8422 TM

IN THE UNITED STATES PATENT OFFICE

BEFORE THE BOARD OF APPEALS

Edwards vs. Simmons

* * *

Patent Interference No. 59,515 between the applications of Charles R. Edwards filed August 24, 1928, Serial No. 301,762 and John T. Simmons filed February 10, 1926, Serial No. 87,323. Testing Device for Wells.

Messrs. Hardway & Cathey, Messrs. Foster & Codier, and Messrs. Jesse R. Stone and Lester B Clark for Edwards.

Messrs. Lyon & Lyon and Messrs. Mason & Mason for Simmons.

[Written in margin]: Noted TM

The party Edwards has filed a petition for reconsideration of our prior decision in which award of priority was made to the party Simmons. The party Simmons has also filed a statement in reply to the petition of Edwards. A number of points have been raised by the party Edwards and they will be considered in the order set forth in the petition.

POINT 1.

It is argued that the testimony taken shows that the device of Simmons is inoperative. During the motion

59515 18

period Edwards filed a motion to dissolve on the ground that Simmons showed an inoperative device. The Examiner of Interferences held that the device was operative. (Paper No. 27; p. 5). Edwards contends that when pressure is applied to the drill stem there will be so much friction between the body or packer 4 and the bushing 19 in the Simmons' device that these parts will rotate together even though the packer is in the rat hole. Hence he argues that it would be impossible to rotate one of these parts with respect to the other so as to open the fluid admission passage. It has been pointed out in the record that if some lubricant be used between these parts the friction will be largely overcome. If such lubricant need be used any mechanic would exercise no invention in using it. The testimony shows that lubricant was used by Simmons and when used the device was formed to operate satisfactorily. (Simmons' record, p. 11, XQ. 237).

In the Simmons' record testimony was given by Stoddard and Halliburton that tests were successfully made with Simmons' Exhibit 1. (pages 77, 78, 105 and 129 to 132 of Simmons' record). Stoddard was asked his opinion of the operativeness of Simmons' Exhibit 1 and stated that he regarded it as being operative. (Simmons' record, p. 82).

Edwards refers to Exhibit No. 45, which is the log of a well where a test is alleged to have been made, and he states that this log does not show any test. The log describes the character of the formations encountered in the well. The semi-daily reports set forth what was done under the direction of the driller at the well. The report would not be expected to show the work done by an independent

59515 19

contractor. The test run at the well was made under the direction of Simmons and not the driller.

Edwards submitted opinion testimony of Evans and Edwards that the Simmons' device would be inoperative but there were no actual tests made by them to demonstrate such inoperativeness. There has been no evidence submitted that the Simmons' disclosure is inoperative in principle or in substance. Hence we do not find that the evidence discloses that the Simmons's device is inoperative.

POINT 2.

Edwards points to the fact that the assignee of Simmons later adopted a construction which involves a stop cock and gear and that this shows that the Simmons' original construction was abandoned as being inoperative. There seems to be no reason to make such an inference. Mechanical changes are continuously made in devices in commercial use but this does not prove that a prior device used is inoperative. The successful operation of the original device was testified to by Stoddard. (Simmons R. 76-82).

POINT 3.

Edwards urges that we review again his contention that Simmons' application as originally filed does not support the counts of the interference. As this has been previously considered it is not necessary to amplify it further. The matter is so fully discussed in the brief of Simmons, pages 118-122, that reference is made to it. It is

pointed out therein in detail how the counts are fully supported by the Simmons' application and the party Edwards has not specifically pointed out why the counts do not apply to it. It is our view that they are clearly readable on Simmons' original disclosure.

POINT 4.

In our decision on the motion to dissolve we pointed out in great details why we regarded that the Edwards' patent No. 1,514,585 did not disclose the invention of the present counts. In our decision on priority we also repeated this holding. There is nothing in the testimony that has changed our view. In regard to the Court decision referred to the reply statement of Simmons points out that the Court held that the patent disclosed a two string testing tool.

The fact that Edwards and Stoddard applied the counts to the patent does not have any particular weight in ascertaining what the patent discloses.

POINT 5.

In our prior decision we found and so stated that Edwards was not diligent at the time Simmons entered the field and that the excuse offered for not being diligent was insufficient. From the record it is obvious that Edwards was not making any effort to reduce the invention to practice at the time Simmons entered the field. The excuse offered was that suits were filed against him on a contract with respect to certain of his patent rights. It appears that the suits were based on a contract, Exhibit

109, dated Jan. 3, 1921 between him and J. O. Mack. This contract does not mention any invention of a one-string tester or a tester which would embody the counts of the interference. It apparently did not prevent Edwards from developing a one-string tester. Hence the excuse offered was deemed insufficient.

POINT 6.

The question whether new matter has been inserted in the Simmons' specification has been disposed of above. The original disclosure is regarded as forming sufficient basis for the counts and no new matter has been inserted.

POINT 7.

In our prior decision we considered all of the testimony as to reduction to practice by Edwards prior to the filing date of Simmons. The test alleged to have been made in an oil well near Humble, Texas was not corroborated. There were no other tests proven prior to the filing date of Simmons.

POINT 8.

The testimony as to diligence was fully considered by us. The activity of Edwards prior to Simmons' filing date was in the exploitation of the two-string tester of his prior patent. This cannot be taken as establishing diligence in the reduction of a single string tester. Furthermore, the circulars which were mailed to the

59515 22

trade after Simmons' filing date related to the two-string tester.

POINT 9.

It was pointed out in our decision that the threatened suits by the stockholders of the Mack Mfg. Co. were regarded insufficient to excuse activity in the reducing a one-string tester to practice.

POINTS 10-13.

These points were treated so fully in our prior decision that we find no reason to add anything further to what was formerly stated. As to points 12 and 13 attention is directed to page 8 of the reply statement of Simmons.

The party Edwards has filed a motion to extend the appeal period thirty days. As the time for filing appeal is fixed by Rule 149 the motion is denied.

We have carefully noted all of the points raised by the party Simmons. In our prior decision we did not discuss some of the points raised as fully as they should have been discussed. A somewhat amplified statement has therefore been made herein in reconsidering the case. In view of the fact that our prior decision was incomplete in some respects the petition for reconsideration is granted. We have carefully reviewed the case but find no reason for arriving at any different conclusion from that arrived at in our prior decision in awarding priority to Simmons.

The petition for reconsideration is granted.

59515 23

The limit of appeal runs from the date of the present decision.

Wm A Kinnon First Assistant Commissioner	)	
W. L. Redrow Examiner-in-Chief	)	Board of Appeals
T. P. Edinburg Examiner-in-Chief	)	

June 26, 1933

59515 24

210

Edwards v. Simmons

[Sheet..........]

1	Jan 30 1930	Declarations Statements etc. Mar 10 1930	
2	Feb 19/30	Statement of Simmons	
3	Feb 27/30	Statement of Edwards	
4	Mar. 12/30	Notice of appointment of asso. attys	
5	" 20/30	Testimony set. F. H. Oct. 7/30.	
6	Apr 18/30	Motion of Simmons to Add Counts & Amdt	

7.	"	19 "	Motion to Diss obj Edwards
8	"	23 "	Comm'r Order (set 122: and 109 if Amended)
9	"	25 "	Memo for Simmons Rule 109)
10	May	1/30	Motion of Simmons to advance hearing
11	May	5/30	Notice of hearing by Law Examiner
12	"	8 "	Brief for Edwards
13	"	9 "	Letter of Law Ex'r
14	"	22 "	Motion by Edwards to postpon hrg.
15	"	" "	Notice by Edwards
16	"	23 "	Protest by Simmons
17	"	24 "	Letter of Law Exr
18	"	" "	Brief for Edwards
19	June	2/30	Brief for Simmons
20	"	" "	" " Edwards
21	"	" "	Letter of Law Exr.
22	"	5 "	Brief for Edwards
23	"	6/30	Affidavit for Simmons
24	"	11/30	Brief for Edwards
25	"	11/30	Protest by Edwards.
26	"	11/30	Appo to motion to amend by Edwards
27	June	24/30	Decision by Exr. of Intfs. L. A. July 24/30.
28	July	7/30	Appeal To The BOARD OF APPEALS Simmons
29	"	23/30	Appeal To The BOARD OF APPEALS Edwards.
30	Aug	7 1930	Letter

59515 25

Edwards vs. Simmons

[Sheet.................]

31	Aug. 13, 1930	Protest by Simmons re Edwards Appeal.
32	Nov. 10, 1930	Hearing by Board set for Jan. 27, '31. 9:30 A. M.
33	Nov. 28, 1930	Supp. Motion to Dissolve by Edwards.
34	Dec. 2, 1930	Protest by Simmons.
35	Dec. 4, 1930	Edwards Motion to Dissolve dismissed.
36	Dec. 3, 1930	Memo. for Edwards.
37	Jan. 5, 1931	Notice by Edwards.
38	Jan. 27, 1931	Brief for Simmons with Appendix.
39	Jan. 27, 1931	Brief for Edwards.
40	Feb. 17, 1931	Decision by Board.
41	Feb. 24, 1931	Testimony reset. F. H. Aug. 11, 1931.
42	Apr. 13, 1931	Motion by Edwards to extend time for testimony.
43	Apr. 14, 1931	Hearing on Motion by Edwards April 24, 1931.
44	Apr. 23, 1931	Affidavit, etc., for Edwards.
45	Apr. 24, 1931	Brief for Simmons.
46	Apr. 25, 1931	Motion granted as indicated. Times extended. F. H. Sept. 22, '31.

47	May 19, 1931	Notice of appointment of associate attorneys.
48	May 26, 1931	Petition, Simmons, for access to and copies of Edwards Exhibits with aff. Rule 75.
49	May 27, 1931	Comms. Order. (Edwards fiven 10 days to show cause why Petition should not be granted.
50	Jun. 3, 1931	Motion by Edwards to extend times for testimony.
51	Jun. 3, 1931	Affidavit for Simmons, opposing motions.
52	June. 5, 1931	Edwards motion to extend times not approved. L. A. June 25, '31
53	Jun. 8, 1931	Stipulation to extend times for testimony etc.,
54	Jun. 8, 1931	Letter from Attorneys for Edwards.
55	Jun. 9, 1931	Dec'n June 5, '31 vacated. Test'y reset. F. H. Oct. 20, '31
56	Jun. 1931	Comms. Decision (Pet. Simmons for access granted) see paper #48
57	Jun. 20, 1931	Notice of Comm'rs. decision on petition.
58	July 25, 1931	Testimony for Edwards. (2volumes)
59	Aug. 5, 1931	Testimony for Simmons
60	Aug. 18, 1931	Rebuttal testimony for Edwards.

59515 26

Edwards -vs- Simmons

[Sheet................].

91	June 29/32		Rebuttal TESTIMONY FOR Edwards
92	"	29 "	EXHIBITS FOR Edwards (Section 24)
93	"	29 "	Letter to "
94	July	5/32.	Letter from Attys. for Edwards, withdrawing motions.
95	"	19 "	PRINTED RECORD FOR Simmons (Vol. 2) (31 copies)
96	"	19 "	Letter to "
97	"	20 "	PRINTED RECORD FOR Edwards (Rebuttal) (31 copies)
98	"	20 "	Letter to "
99	Aug.	8/32.	Motion by Simmons to suppress testimony.
100	"	8/32.	Opposition by Edwards to motion to suppress.
101	"	10 "	Letter to Parties.
102	Aug.	23/32.	Motion by Simmons to strike out testimony.

103	"	26 "	BRIEFS FOR Simmons (6 copies)
104	"	26 "	BRIEFS FOR Edwards (6 typewritten copies)
105	"	26	Briefs for Edwards on motion (6 typewritten copies)
106	Dec.	21/32.	Decided favor Edwards. L. A. Jan. 21/33.
107	Jan.	13/33	Appeal To The BOARD OF APPEALS Simmons
108	"	18 "	Hearing by Board set for April 28/33
109	"	20/33	Proof of service in re appeal of Simmons (already furnished)
110	"	21/33	Appeal To The BOARD OF APPEALS Edwards (No right of Appeal)

[In margin]: 8322

111	Feb.	1/33	Decision by Board on Edward's Appeal (Dismissed)
112	Mar.	28/33	Brief for Simmons (6 copies) Proof of Service
113	Apr.	18/33	Brief for Edwards (6 copies) Pr. of Service
114	May	16/33	Decision by Board. (Reversed)
115	June	1 "	Petition for Reconsideration by Edwards

116	"	16/33	Reply by Simmons to Edwards' Pe for Recon
117	"	20/33	Motion by Edwards for Extension Time to file Appeal
118	"	22/33	Letter by Edwards.
119	"	26/33	Decision by Board on Pet. for Reco sideration (Granted)
120			Decision Noted Div. 38
121—Nov.		23/33	Record (Exhibits for Simmons (turned (See letter)
122—Nov.		25/33	Record (Exhibits for Edwards (turned. (See receipt)

59515

[Stamped on back]: Assembled by M H. Revis by.......................... Letter No. 136221 Date..............

No. D-56-Eq Halliburton et al vs. Honolulu Oil Co Plfs EXHIBIT No. 3 Filed 11/11 1935 R. S. ZI MERMAN, Clerk, By .... Deputy Clerk.

[PLAINTIFFS' EXHIBIT NO. 4-A.]

390

DEPARTMENT OF COMMERCE
United States Patent Office

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of Papers 1 and 39, in the matter of

Interference Number 55,940,

Williams vs Allen vs Powell vs Lewis vs Erickson vs Johnson vs Cox vs Simmons
Subject Matter:–
Well Tester.

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this twenty-ninth day of October , in the year of our Lord one thousand nine hundred and thirty-five and of the Independence of the United States of America the one hundred and sixtieth.

[Seal]

Attest:

C. W. Sutton
Acting Chief of Division.

Conway P. Coe
Commissioner of Patents.

Intf A

Letter No.

[Stamped]: Intf. Number 55940 Intf. Declared Oct 10 1927 Statements Due Nov 14 1927

Room No. 145

2–251

Address only

The Commissioner of Patents
Washington, D. C."

UNITED STATES
DEPARTMENT OF ~~THE INTERIOR~~ COMMERCE
PATENT OFFICE

Washington, D. C.

Oct 5-1927, 192

EXAMINER OF INTERFERENCES:

An interference is found to exist between the following cases, and in respect to the invention therein specified. to wit:

CASES

~~1. Name. Charles L. Williams,~~

~~Post office address 969 B Union Trust Bldg. Pittsburgh, Pa.~~

~~Title Apparatus for Testing Wells~~

Filed ~~Aug. 27, 1927, Ser. No. 215,839~~
~~Pat'd No.~~

~~Division or continuation of~~

~~Attorney Arch- orth Martin of 513 Union Trust Bldg., Pittsburgh, Pa.~~

~~Associate Att'y of~~

~~Assignee of~~

~~2. Name Otto J. Allen~~

~~Post office address 409 Sames Moore Bldg.,~~
~~Laredo, Webb County,~~
~~Texas.~~

~~Title Well Tester,~~

~~Filed July 25, 1927 Ser. No. 208,150~~
~~Pat'd No.~~

~~Devision or continuation of~~

Attorney Hardway & Cathey, of 428 Bankers Mortgage Bldg., Houston, Texas.

Associate Att'y of

Assignee of

~~(7) 3. Name Conrad T. Nietzel,~~

~~Post office address 2236 Live Oak St., Dallas, Texas.~~

~~Title Well Testing Tools~~

~~Filed June 28, 1927 Ser. No. 202,150 (Reissue) of Pat. No. 1625140 granted Apr. 19/27 on appln. No. 167910, filed February 14, 1927 No~~

~~Division of continuation of~~

~~Attorney Jack A. Schley, of 904 Allen Bldg., Dallas, Texas~~

~~Associate Att'y Alfred T. Gage, of 3015 Legation St., Washington, D. C.~~

~~Assignee of~~

INVENTION

Intf. No. 55941 Consolidated herewith

~~(3)~~ ~~4.~~ ~~Name: Ernest Powell~~

~~Post Office Address: Box 56A, Route 1, Va~~
~~Ormy~~
~~Orma, Texas.~~

~~Title: Well Tester.~~

~~Filed: May 10, 1927, Ser. No. 190,16~~
~~Pat'd No.~~

~~Attorney: Jesse R. Stone, of C/o Andrews~~
~~Streetman, Logue & Mobley~~
~~Union Nat. Bank Bldg., Hou-~~
~~ton, Texas.~~

Associate Att'y:

Assignee:

(1) ~~5.~~ Name: Guy V. Lewis,

Post Office Address: Robert E. Lee Hotel
Laredo, Texas.,

Title Well Testing Device

Filed May 6, 1927, Ser. No. 189,294,
Pat'd. No.

Attorney: Jesse R. Stone; of Andrews
Streetman, Logue & Mobley
Union National Bank Bldg
Houston, Texas.

Associate Att'y:

Assignee:

~~(5)~~ ~~6.~~ ~~Name: David Erickson,~~

~~Post Office Address: Erickson Pattern Words,~~ k
~~508 Ohio Ave Wichita Falls, Texas.~~

~~Title: Oil Well Packers.~~

~~Filed. April 11, 1927; Ser. No. 182,817, Pat'd. No.~~

~~Attorney: Watson, Coit, Morse and Grindle, of Mather Bldg Washington D. C.~~

~~Associate Att'y:~~

~~Assignee:~~

55940—2

~~(6)~~ ~~8.~~ ~~Name: Edgar Clinton Johnston,~~

~~Post. Office Address: El Dorado, Union Co~~
~~Arkansas,~~

~~Title: Well Formation Testing Device~~

~~Filed: Mar. 23, 1927, Ser. No. 177,719,~~
~~Pat'd. No~~

~~Attorney: Clarence A. O'Brien, of Sec. Sv~~
~~& Coml Bank Bldg., Washin~~
~~ton, D. C.~~

~~Associate Att'y:~~

~~Assignee: Johnston Formation Testing Corp~~
~~ration, of El Dorado, Arkans~~

(2)
~~7~~ ~~(8)~~ ~~9.~~ Name: Ernest H. Cox,

Post Office Address: Duncan, Stephens C
Oklahoma.,

Title: Oil Well Testing Device

Filed: Feb. 4, 1927, Ser. No. 165,9
Pat'd. No

Attorney: Eccleston & Eccleston of Loan
Trust Bldg., Washington, D.

Associate Att'y:

Assignee:

(3)

8 ~~(9) 10.~~ Name: John T. Simmons,

Post Office Address: P. O. Box 1411, El Dorado, Arkansas

Title: Method and Apparatus for Testing the Productivity of Formations Encountered in Wells

Filed: Feb. 10, 1926, Ser. No. 87,323, Pat'd. No.

Attorney: Lyon & Lyon, of 708 National City Bank Bldg., Los Angeles, Calif.

Associate Att'y: J. M. Mason, McGill Bldg., Washington, D. C.

Assignee: Erle P. Halliburton, of Los Angeles, Calif.

Intf. No. 55941 Consolidated herewith

INVENTION

[In margin]: Dissolved See Paper No 39

~~1. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering a sample chamber into the well through the drilling fluid to the formation to be tested, the chamber being closed against the entrance of fluid from the well during the lowering operation, sealing off the well above the formation to exclude the drilling fluid from the formation, opening the chamber to permit cognate fluid from the formation to enter the chamber, closing the chamber against the entrance of fluid from the well,~~

55940—3

Sheet 4.

~~releasing the seal and removing the chamber so closed to withdraw an entrapped sample of fluid from below the point at which the well was sealed off.~~

~~2.~~ 1. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well.

~~3.~~ 2 A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valved inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognate fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well

through the inlet and releasing the packer, and raising the test string with the inlet closed against the entrance of fluid from the well to remove an entrapped sample and the packer.

3 Apparatus for testing a well comprising a string of pipe to be lowered into a well having an inlet at its lower end and carrying a packing for sealing the well above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

4 Apparatus for testing a well comprising a string or pipe to be lowered into the well, a packer carried by the pipe and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

5 Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes an empty string of pipe to be lowered into the well to adjacent the formation to be tested, a packer carried by the pipe, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

Sheet 5.

~~7.~~ 6 Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

~~8.~~ 7 Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

~~9.~~ 8 Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer carried by the pipe for sealing off the well above the formation, an inlet below the packer opening into the pipe, and a valve for the in-

let, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

[In margin]: Dissolved See Paper 39

~~10. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, means carried by the string of pipe to permit the flow of cognate fluid from the formation into the pipe, said means including relatively movable parts having passages adapted to be brought into alignment to allow the fluid to flow into the pipe and brought out of alignment to retain the fluid in the pipe, and a packer mounted on one of said parts for sealing off the drilling fluid from the formation while the passages are aligned.~~

~~11.~~ 9 Apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove the entrapped sample, said pipe being closed against the flow of drilling fluid as the pipe is lowered into the well, a packer carried by the pipe as the pipe is lowered into and removed from the well and adapted to be seated by manipulation of the pipe to seal off the well above the formation, an inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well.

~~12~~ 10 Apparatus for testing a well containing drilling fluid

55940—5

Sheet No. 6

comprising a single string of pipe to be lowered into t well through the drilling fluid, said pipe being clos against the entrance of the drilling fluid, means at t lower end of the pipe for receiving a sample includi an inlet opening into the pipe, means carried by the pi for sealing the well above the inlet, and a valve for t inlet that may be positively opened and closed by mov ment of the pipe while the well is sealed above the inlet.

For counts 11 and 12 see Intf. No. 55941

The relation of the counts of the interference to t claims is as follows:

Counts		Williams	Allen	Neitzel	Powell	Lewis	Erickson	Johnston	Cox
	~~1~~	~~15~~	~~13~~	~~18~~	~~8~~	~~10~~	~~16~~	6	~~7~~
1	~~2~~	16	14	19	9	11	17	7	8
2	~~3~~	17	15	20	10	12	18	8	9
3	~~4~~	18	16	21	11	13	19	9	10
4	~~5~~	19	17	22	12	14	20	10	11
5	~~6~~	20	20	25	15	17	23	13	14
6	~~7~~	21	21	26	16	18	24	14	15
7	~~8~~	22	22	27	17	19	25	15	16
8	~~9~~	23	23	28	18	20	26	16	17
	~~10~~	~~24~~	~~24~~	~~29~~	~~19~~	~~21~~	~~27~~	~~17~~	~~18~~
9	~~11~~	25	25	30	20	22	28	18	19
10	~~12~~	26	26	31	21	23	29	19	20

(Counts compared)

B.

Respectfully,

C. F. Krafft

Examiner, Division 38

55940-

[Stamped]: Docket Clerk Nov 1 1928 Copy Mailed

Hearing: July 27, 1928. MSP

In the United States Patent Office

Williams v. Allen v. Powell v. Lewis v. Erickson v. Johnston v. Cox v. Simmons.

Patent Interference No. 55,940.

Motions to Dissolve.

Well Tester.

Application of Charles L. Williams filed Aug. 27, 1927, No. 215,839.

Application of Otto J. Allen filed July 25, 1927, No. 208,150.

Application of Ernest Powell filed May 10, 1927, No. 190,166.

Application of Guy V. Lewis filed May 6, 1927, No. 189,294.

Application of David Erickson filed Apr. 11, 1927, No. 182,817.

Application of Edgar Clinton Johnston filed Mar. 23, 1927. No. 177,719.

Application of Ernest H. Cox filed Feb. 4, 1927, No. 165,984.

Application of John T. Simmons filed Feb. 10, 1926, No. 87,323.

Mr. Archworth Martin for Williams.

Messrs. Hardway & Cathey for Allen.

Mr. Jesse R. Stone for Powell.

Mr. Jesse R. Stone for Lewis.

Messrs. Watson, Coit, Morse & Grindle for Erickson.

Mr. Clarence A. O'Brien and Mr. Edwin E. Huffman for Johnston.

Messrs. Eccleston & Eccleston for Cox.

Messrs. Lyon & Lyon and Messrs. Mason & Mason for Simmons.

The party Erickson moves to dissolve. His first motion alleged that counts 1, 3 and 10 are anticipated by the patents to:

Edwards.	No. 1,514,585	Nov. 4, 1924
Cooper.	No. 1,000,583	Aug. 15, 1911

His second motion rests on the following grounds:

A. Now comes the party Erickson, by his attorneys and moves that this interference be dissolved as to Counts

55940—7

1, 2, 3, 6, 7, 8 and 11 as failing to properly define invention as required by Sec. 4888 of the Revised Statutes.

B. It is further moved that this interference be dissolved as to all of the counts of the issue, as to the party Erickson, on the ground that the party Erickson cannot make the claims as drawn.

C. In addition, if these counts are construed to read upon Erickson, then in the same manner they read upon the prior patent to Cox, No. 1,347,534, July 27, 1920.

His third motion requests dissolution as to counts 2, 4 to 9, inclusive, 11 and 12 in view of the Edwards patent above cited, particularly as supplemented by the patent to Hemme, No. 976,737, November 22, 1910.

and

The parties Lewis & Johnston move to dissolve in view of the Edwards and Cooper patents cited by Erickson.

The issue includes ten counts, of which the first three are directed to a method of testing and the remainder relate to the testing apparatus. They appear in the declaration and are not reproduced.

The first motion by Erickson submits the patents to Cooper and Edwards for anticipation of counts 1, 3 and 10. The party Simmons contends that these patents are inoperative and supports the statement by affidavits. The affidavits have been considered so far only as they appear to traverse a mode or capability of operation of a reference. Roller v. Goodwin, 1921 C. D. 11. The patent to Edwards is not so inoperative that it cannot be used as a reference. Commercial operativeness is not required. Count 1 says nothing about the size of or depth of the well, or any conditions which would make it impossible to use the Edwards device in the manner described in the patent. The sample is merely a portion of the "cognate" fluid of the formation which may be oil, or gas or other fluid from the stratum to be tested. The sample chamber is the end of a pipe carrying the testing device and may

extend to the top of the well. There are no limits specified for the size of the chamber or the amount of the sample. There is no doubt that when stem 8 is in the position of Fig. 2 a quantity of oil, gas or other fluid may pass under pressure through the perforated section of the stem 8 of Edwards' testing device and be examined as a sample of the quality and quantity of flow of the fluid. The perforated end of the stem 8 obviously may be drawn up into the sleeve 7 and the two withdrawn from drill pipe 1 before withdrawal of the drill pipe. Apparently the threaded end of stem 8 could be reengaged with the threaded end of sleeve 7 without dislodging sleeve 7 until it was necessary to draw up both the stem 8 and sleeve 7. The last paragraph of Edwards' specification states how the apparatus may be finally withdrawn from the well and does not necessarily mean that the perforated end of the stem 8 must be below sleeve 7 when the packer has been released. Sealing off the well above the formation is accomplished by the packer 5 and releasing the seal and removing the chamber are obvious steps in the use of the Edwards device. If the chamber is closed by the lower end of stem 8 engaging sleeve 7; which appears to be a capability of operation inherent in the apparatus, sleeve 7 and stem 8 will be withdrawn together by an upward pull on stem 8 and will withdraw whatever fluid may be entrapped in the chamber, the fluid coming from below the point at which the well was sealed off.

Count 1 is held unpatentable over the Edwards patent. The Edwards patent does not anticipate count 3 since it employs two strings of pipe. Nor does it anticipate count 10 since the packer 5 which seals off the drilling fluid from the formation is not mounted on one of the two relatively movable parts such as sleeve 7 and stem 8.

3. 55940 9 ~~55 123~~

The patent to Cooper does not discl[illegible] he method of count 1 since the testing is by pumping or bailing and not by withdrawal of a closed chamber with entrapped sample of fluid. The patent is not a sufficient reference for count 3 since two strings of pipe are necessary. The patent is a substantial anticipation of the apparatus claimed in count 10 which is not restricted to a use such as set forth in the method of count 1. It is immaterial whether valve sleeve 23 has a passage in it or not since it may uncover the opening 24 in pipe 2 by bringing another opening in alinement with opening 24 as an obvious mechanical equivalent. The count does not call for a closed chamber or the withdrawal of a closed chamber with an entrapped sample.

In the second motion by Erickson counts 1, 2, 3 and 11 are alleged to be functional because each of them contains the function of withdrawing an "entrapped sample", and counts 6, 7 and 8 are alleged to be functional because each of them contains the functional statement "to receive" a sample or fluid. Count 3 is further alleged not to comply with the statute in that it does not set forth a proper method claim.

Count 1 in line 3 refers to a sample chamber and to opening the chamber to permit cognate fluid from the formation to enter the chamber and further refers to closing the chamber. The method of count 1 is not limited to any specific mode of entrapping a sample but it is evident that the closed chamber is to retain a sample entrapped in some way. No specific reference in the count to a device for entrapping is necessary and entrapping may be incidental to closing the chamber. It does not appear to be a vital matter that no distinct step of en-

4 55940 # 10 ~~55 124~~

trapping is recited in the count. Similar remarks appl to counts 2 and 3. In the apparatus of count 11 som means for entrapping a fluid sample must be necessaril implied by the reference to removing the entrapped sampl if the means for controlling the inlet to the pipe i inadequate.

The limitation in count 3 to the use of only a singl string of pipe cannot be disregarded. Smithey v. Myers 1927 C. D. 165.

Counts 6, 7 and 8 contain sufficient structure to "re ceive" a sample and if "receive" necessarily implie retaining, means at the lower end of the pipe to recei a sample also includes means to receive and to retain.

The motion does not state in the explanation of groun B that counts 1, 2, 3 and 11 as drawn are not readabl on the party Erickson and discussion of these counts i unnecessary.

Counts 4, 5 and 9 do not require direct actuation o the valve for the inlet by contact with the pipe. They ca for positive control of the valve by movement of the pip It is clear that valve 23 of Erickson is positively controlle by movement of the pipe which causes lug 25 of the valv to contact bushing 36 to open the valve, and there ca be no closing of the valve until the pipe has moved upwar enough to release lug 25 from the bushing 36. The move ment of the pipe positively controls the valve.

As to counts 4, 5 and 12 the motion asserts that n movement of the valve 23 of Erickson can be accomplishe while the packer is seated. In the downward movemen of the pipe from the position in Fig. 1 to that in Fig. the packer is compressed before the valve is opened an the packer remains compressed to some extent as the pip begins its upward movement. The opening and closing o the inlet is therefore caused while the packer is seate

5. 55940. 11 5 55 125

Counts 6, 7 and 8 can be made by Erickson. A valve structure is not limited to a valve per se, but may comprise a movable valve and an element cooperating therewith. The valve structure of Erickson may include collar 36 as well as valve 23.

Count 10 is not clearly readable on Erickson's disclosure. There are no relatively movable parts having passages adapted to be brought into alignment to allow fluid to flow into the pipe and brought out of alignment to retain fluid in the pipe as in the device of Simmons. The passages in pipes 12 and 33 are permanently in axial alignment.

It is not apparent that the patent to Cox is a satisfactory reference for any count except count 1. The glass plate 13a at the lower end of the rubber packer 10 is not a valve, and the sample is received in an inner tube or hose not in a pipe which carries the packer. Other differences are obvious. Count 1 does not require the employment of the method in a deep well wherein the shock of a drop would be destructive to the pipe, nor is it necessary that the sample should be from a large area of the formation. The packer, if of proper proportionate size, would apparently expand sufficiently to seal the well above the formation to be tested. The check valve 15 is designed to hold sample liquid in the interior of nipple 9 and hose 13. If the valve shown is not suitable for the purpose any suitable construction may be used. As the pipe 1 is raised any pressure of fluid in nipple 9 through perforations 8 upward against valve 15 would not necessarily be so unbalanced by downward pressure above valve 15 that the valve would stay open and the sample in pipe 13 be made useless by contamination.

The third motion by Erickson relies upon the patent

6 55940 12 55 ~~126~~

to Edwards No. 1,514,585 supplemented by the patent to Hemme No. 976,737 to meet counts 2, 4 to 9 inclusive, 11 and 12. The latter patent is for a packer not a tester. It was cited merely to show that it is old to provide a valve positively opened and closed by movement of the pipe.

Modifications of the Edwards device suggested in the motion are not clearly taught by other patents and are not obvious. Both pipes 1 and 8 are essential. The pipe 1 carries the packer but movements of pipe 1 do not control the opening and closing of an inlet to pipe 1.

The motions by Lewis and Johnston deny patentability to the counts in view of the patents to Edwards & Cooper discussed above and further discussion of the patents is unnecessary. There is no suggestion in the Edwards patent that sleeve 7 could be made to engage the upper end of a "rat hole" or the walls of the well.

The motion by Johnston further contends that Johnston cannot make count 10 if the limitation as to valve details distinguishes from the Edwards patent. Count 10 is not fully readable on the Johnston disclosure since there are no relatively moveable parts having passages adapted to be brought into alignment and brought out of alignment. The passages 4 and 5 are permanently in alignment.

The motions by Erickson are denied as to all counts except counts 1 and 10 and are granted as to these counts.

The motion by Lewis is also denied as to all counts except count 1 and is granted as to this count.

The motion by Johnston is granted as to counts 1 and 10 and is denied as to other counts.

A limit of appeal is set to expire ~~November 21, 1928~~ November 1, 1928.

J. P. Disney
Law Examiner.

7 55940 13 ~~55 127~~

[Stamped on back]: Assembled by M. H. Revised by .... Letter No. 136221 Date

No. D-56-Eq. Halliburton et al vs. Honolulu Oil Corp. Plfs Exhibit No. 4-A Filed 11/11 1935 R. S. ZIMMERMAN, Clerk By Cross, Deputy Clerk.

[PLAINTIFFS' EXHIBIT NO. 4-B.]

390

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of Papers 1 and 40, in the matter of

Interference Number 55,941,

Allen vs Williams vs Powell vs Lewis vs Erickson vs Johnston vs Cox vs Simmons,

Subject Matter:–
Well Tester.

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this twenty-ninth day of October, in the year of our Lord one thousand nine hundred and thirty-five and of the Independence of the United States of America the one hundred and sixtieth.

[Seal]

Conway P. Coe
Commissioner of Patents.

Attest:

C. W. Sutton
Acting Chief of Division.

Bryant: MEB

2–251

Room No. 145 Intf I

Address only
The Commissioner of Patents
Washington, D. C.

Letter No.

UNITED STATES
DEPARTMENT OF ~~THE INTERIOR~~ COMMERC
PATENT OFFICE
WASHINGTON, D. C.

Oct 5–1927. 192

EXAMINER OF INTERFERENCES:

An interference is found to exist between the followin cases, and in respect to the invention therein specifie to wit:

CASES

~~1. Name Otto J. Allen~~

~~Post office address 409 Sames-Moore Bld~~
~~Laredo, Webb County, Texa~~

~~Title Well Tester~~

~~Filed July 25, 1927 Ser. No. 208,150~~
~~Pat'd No.~~

~~Division or continuation of~~

~~Attorney Hardway & Cathey of 428 Banke~~
~~Mortgage Bldg., Houston. Tex~~

~~Associate Att'y of~~

~~Assignee of~~

~~(1)2. Name Conrad T. Neitzel~~
~~Post office address 2236 Live Oak St.,~~
~~Dallas, Texas.,~~

~~Title Well Testing Tools~~
~~Filed June 28, 1927 Ser. No. 202,150~~
~~(Reissue) of Patent No. 1625140, granted April 19/27, on appln. No. 167910, filed February 14, 1927.~~

~~Division or continuation of~~
~~Attorney Jack A. Schley, of 904 Allen Bldg., Dallas, Texas~~
~~Associate Att'y Alfred T. Gage, of 3915 Legation St., Washington, D. C.~~
~~Assignee of~~

~~(2)3. Name Charles L. Williams~~
~~Post office address 130 N. Negley Ave;~~
~~Pittsburgh Pa.~~

~~Title Method of and Apparatus for Testing Wells~~
~~Filed June 4 1927 Ser. No. 196,461~~
~~Pat'd No.~~

~~Division or continuation of~~
~~Attorney Archworth Martin of 513 Union Trust Bldg., Pittsburgh, Pa.~~
~~Associate Att'y of~~
~~Assignee of~~

INVENTION

Consolidated with Intf. 55940

55941—1

[Stamped on face]: Intf. Number 55941 Intf. declared Oct 10 1927 Statements due Nov 14 1927

3 ~~4.~~ ~~Name: Ernest Powell~~
~~Post Office Address: Box 56A, Route 1,~~
~~Von Orma, Texas~~
~~Title: Well Tester,~~
~~Filed: May 10, 1927, Ser. No. 190,166,~~
~~Pat'd. No.~~
~~Attorney: Jesse R. Stone, of~~ C/o ~~Andrews~~
~~Streetman, Logue & Mobley~~
~~Union Nat. Bank Bldg., Houston, Texas~~
~~Associate Att'y~~
~~Assignee:~~

(1)~~5.~~ Name: Guy V. Lewis
Post Office Address: Robert E Lee Hotel,
Lareda, Texas
Title: Well Testing Device
Filed: May 6, 1927, Ser. No. 189,294,
Pat'd. No.
Attorney: Jesse R. Stone; of
Andrews, Streetman, Logue & Mobley
Union National Bank Bldg., Houston, Texas
Associate Attorney:
Assignee:

~~(5)6.~~ ~~Name: David Erickson~~
~~Post Office Address: Erickson Pattern Works~~
~~508 Ohio Ave., Wichita Falls, Texas~~
~~Title: Oil Well Packers,~~
~~Filed: April 11, 1927; Ser. No. 182,817.~~
~~Pat'd. No.~~
~~Attorney: Watson, Coit, Morse & Grindle,~~
~~Mather Bldg., Washington, D. C.~~
~~Associate Att'y:~~
~~Assignee.~~ 55941--2

(6)~~7.~~ ~~Name: Edgar Clinton Johnston,~~

~~Post Office Address: El Dorado, Union Co., Arkansas,~~

~~Title: Well~~ Formation ~~Testing Device~~

~~Filed: Mar. 23, 1927, Ser. No. 177,719,~~
~~Pat'd. No.~~

~~Attorney: Clarence A. O'Brien,~~

~~Security Savings & Commercial Bank Bldg., Washington, D. C.~~

~~Associate Attorney:~~

~~Assignee:~~

~~Johnston Formation Testing Corporation of El Dorado, Arkansas~~

(2)~~8.~~ Name: Ernest H. Cox,

Post Office Address: Duncan, Stephens County, Oklahoma

Title: Oil Well Testing Device

Filed: Feb. 4, 1927, Ser. No. 165,984,
Pat'd. No.

Attorney: Eccleston & Eccleston of
Loan & Trust Bldg., Washington, D. C.

Assignee:

(3)~~9.~~ Name: John T. Simmons,

Post Office Address: P. O. Box 1411, El Dorado, Arkansas

Title: Method and Apparatus for Testing Productivity of Formations Encountered Wells

Filed: Feb. 10, 1926, Ser. No. 87,323,
Pat'd. No.

Attorney: Lyon & Lyon,
708 National City Bank Bl
Los Angeles, C

Associate Att'y: J. M. Mason,
McGill Bldg., Washington, D

Assignee: Erle P. Halliburton, of
Los Angeles, C

Consolidated with Intf. 55940

INVENTION

11

Count 1: Apparatus for testing a well contai drilling fluid, which includes an empty string of pip be lowered in the well to adjacent the formation t tested, means at the lower end of the pipe to recei sample from the formation including an inlet ope into the pipe and a valve for controlling the inlet, means carried by the pipe for sealing the well above inlet, the valve being positively controlled by movemen the pipe.

5594

Sheet 4

12

Count ~~2~~: Apparatus for testing a formation encountered in a well containing drilling fluid, which includes a single string of pipe to be lowered into the well to adjacent the formation to be tested, a valved inlet at the lower end of the pipe positively controlled from the top of the well by movement of the pipe and a packer carried by the pipe above the inlet.

For counts 1 to 10 inclusive see Intf. 55940.

The relation of the counts of the interference to the claims is as follows:

Counts	Allen	Neitzel	Williams	Powell	Lewis	Erickson	Johnston	Cox	Simmons
11 ~~1~~	18	23	15	13	15	21	11	12	28
12 ~~2~~	19	24	16	14	16	22	12	13	29

(Counts Compared)
B.

Respectfully,

C. F. Krafft
Examiner, Division 38.

55941—4

[Stamped on face]: Docket Clerk Nov 1, 1928 Copy mailed

Hearing:

July 27, 1928. SET

In the United States Patent Office.

Allen v. Williams v. Powell v.
Lewis v. Erickson v. Johnston v. Cox v. Simmons.

Patent Interference No. 55,941.

Motion to Dissolve.

Well Tester.

Application of Otto J. Allen filed July 25, 1927, No. 208,150.

Application of Charles L. Williams filed June 4, 1927, No. 196,461.

Application of Ernest Powell filed May 10, 1927, No. 190,166.

Application of Guy V. Lewis filed May 6, 1927, No. 189,294.

Application of David Erickson filed April 11, 1927, No. 182,817.

Application of Edgar C. Johnston filed Mar. 23, 1927, No. 177,719.

Application of Ernest H. Cox filed Feb. 4, 1927, No. 165,984.

Application of John T. Simmons filed Feb. 10, 1926, No. 87,323.

Messrs. Hardway & Cathey for Allen.

Mr. Archworth Martin for Williams.

Mr. Jesse R. Stone for Powell and for Lewis.

Messrs. Watson, Coit, Morse & Grindle for Erickson.

Mr. Clarence A. O'Brien and Mr. Edwin E. Huffman for Johnston.

Messrs. Eccleston & Eccleston for Cox.

Messrs. Lyon & Lyon and Messrs. Mason & Mason for Simmons.

The party Lewis moves to dissolve on the ground that the counts are not patentable in view of the following patents:

Edwards,	No. 1,514,585,	Nov. 4, 1924,
Cooper,	No 1,000.583,	Aug. 15, 1911.

The party Johnston moves to dissolve on the ground that the counts are not patentable in view of the same Edwards patent.

The party Erickson moves to dissolve on the ground that the counts are not patentable in view of the same Edwards patent supplemented by the patent to Hemme, No. 976,737, Nov. 22, 1910, and also on grounds which are as follows:

(A) Now comes the party Erickson, by his attorneys, and moves that this interference be dissolved as to Count 1 as

55941 5

~~78~~

failing to properly define invention in accordance with Sec. 4888 of the Revised Statutes.

(B) It is further moved that the interference be dissolved as to Counts 1 and 2, as to the party Erickson, for the reason that the party Erickson cannot make the counts as drawn.

(C) In addition, if these counts are construed to read on Erickson, then in the same manner they will read on the patent to Cox, No. 1,347,534, July 27, 1920.

The Edwards patent does not anticipate the counts because the pipe 1 which carries the packer 5 is not the pipe with an inlet opening controlled by a valve, nor is the tapered end of stem 8, which may be the equivalent of a valve, positively controlled by movement of pipe 1. The sleeve 7 is not a means for sealing the well.

The party Lewis does not apply the Cooper patent in his motion and it requires no discussion. It is not apparent, however, from the consideration of this patent in connection with Interference No. 55,940 that it would anticipate the counts of the instant interference.

The motion of the party Johnston calls for no further discussion, since no additional reference other than the Edwards patent is cited. The Erickson motion does not assert that the Edwards patent fully anticipates the counts, but alleges that it is capable of obvious modification. The modification necessary to make the Edwards patent a sufficient reference is not taught by the patent to Hemme and would materially change the device of Edwards to introduce a new mode of operation.

No extensive discussion of the alleged functionality of count 1 is required. The count includes "means at the lower end of the pipe to receive a sample" and if anything more than an inlet opening and a valve is needed to enable the apparatus to receive a sample for testing, it would be

necessarily implied. Obviously, it would be futile to receive a sample if it could not be carried to the top of the well for testing.

The party Erickson can make counts 1 and 2 so far as the limitation that the valve is positively controlled by movement of the pipe is concerned for reasons stated in the decision of the law examiner discussing his motion in Interference No. 55,940.

The Cox patent No. 1,347,534 is not anticipatory of the counts. The valve 15 does not close an inlet for pipe 1 which carries the sealing means or packer 10, and the glass plate 13a is not a valve. Valve 15 is not positively controlled by pipe 1.

The affidavits submitted on behalf of Simmons have been considered only so far as they appear to traverse a mode or capability of operation attributed to a reference (Rule 76).

The motions are denied.

I. P. Disney
Law Examiner.

November 1, 1928.

55941 7
~~80~~

3

[Stamped on back]: Assembled by M. H. Revised by .... Letter No. 136221 Date ....

No: D-56-Eq. Halliburton, et al vs. Honolulu Oil Corp. Plffs EXHIBIT No. 4-B Filed 11/11 1935 R. S. ZIMMERMAN, Clerk. By Cross Deputy Clerk.

[PLAINTIFFS' EXHIBIT No. 6.]

THE DISTRICT COURT OF THE UNITED STATES FOR THE EASTERN DISTRICT OF TEXAS, TYLER DIVISION.

LE P. HALLIBURTON -
HALLIBURTON OIL -
LL CEMENTING COM- -
NY, a corporation, -
-
Plaintiffs, -
vs. - In Equity No. 693.
-
HNSTON FORMATION -
STING CORPORATION, -
corporation, and E. C. -
HNSTON, -
Defendants. -
- - - - - - - - - - - -

INTERLOCUTORY DECREE

This cause having been tried and the Court having made entered its Findings of Fact and Conclusions of Law ein,

T IS HEREBY ORDERED, ADJUDGED AND CREE AS FOLLOWS:

. That Letters Patent of the United States No. 60,987, issued October 17, 1933, entitled "METHOD D APPARATUS FOR TESTING THE PRODUC-ITY OF FORMATIONS ENCOUNTERED IN ELLS", are good and valid in law, particularly as to ims 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 reof.

2. That plaintiff, Erle P. Halliburton, is the sole and exclusive owner of the aforesaid Letters Patent, and that Halliburton Oil Well Cementing Company is the sole and exclusive licensee under said patent, and said plaintiffs are the owners of any and all rights of action and recovery for infringement thereof.

3. That the defendant, Johnston Formation Testing Corporation, has infringed United States Letters Patent No. 1,930,987, particularly claims 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19 thereof, by making, using and selling and causing to be made, used and sold apparatus like the apparatus illustrated in Exhibits A, B and C to defendants' answers to plaintiffs' interrogatories in this cause (Plaintiffs' Exhibit 14):

4. That a perpetual injunction issue out of and under the seal of this Court directed to the defendant, Johnston Formation Testing Corporation, its officers, agents, servants, employees and attorneys, or those in active concert or participating with them, enjoining and restraining them, and each and every of them, from directly or indirectly in any manner making, using or selling, or causing to be made, used or sold, any apparatus covered by claims 9 to 17 and 19 of Letters Patent No. 1,930,987 in suit, and from directly or indirectly using or causing to be used any method covered by claims 8 and 18 of said Letters Patent, which claims read as follows:-

8. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered.

setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well.

9. Apparatus for testing a well comprising a string of pipe to be lowered into a well having an inlet at its lower end and carrying a packer adapted to be positively pressed against the walls of the formation to seal off the same above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

10. Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer carried by the pipe said packer adapted to be positively pressed against the walls of the formation to seal off the same and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

11. Apparatus for testing a well containing drilling fluid, which includes an empty string of pipe to be lowered in the well to adjacent the formation to be tested, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve for controlling the inlet, and means carried by the pipe for sealing the well above the inlet said means consisting of a packer adapted to be positively pressed against

the walls of the formation to seal off the same, the val
being positively controlled by movement of the pipe.

12. Apparatus for testing a formation encountered a well containing drilling fluid, which includes a sin string of pipe to be lowered into the well to adjacent t formation to be tested, a valved inlet at the lower end the pipe positively controlled from the top of the well movement of the pipe and a packer carried by the pi above the inlet, said packer being adapted to be positive pressed against the walls of the formation to seal off t same.

13. Apparatus for testing the productivity of a fo mation encountered in a well containing drilling flu which includes an empty string of pipe to be lowered in the well to adjacent the formation to be tested, a pack carried by the pipe adapted to be positively pressed agai the walls of the formation to seal off the same, means the lower end of the pipe to receive a sample from t formation including an inlet opening into the pipe and valve structure for controlling the inlet, the valve stru ture including a plurality of relatively movable parts o of which is secured to the pipe and another of which connected to the packer.

14. Apparatus for testing the productivity of a fo mation encountered in a well containing drilling flu which includes a single empty string of pipe to be lowe into the well to adjacent the formation to be tested, mea lowered into the well by said string of pipe for seali off the drilling fluid from the formation to be tested, s sealing means being adapted to be positively pres against the walls of the formation to seal off the sa means at the lower end of said string of pipe to receiv

sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

15. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

16. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer carried by the pipe for sealing off the well above the formation an inlet below the packer opening into the pipe, said packer adapted to be positively pressed against the walls of the formation to seal off the same, and a valve for the inlet, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

17. Apparatus for testing a well containing drilling fluid, comprising a single string of pipe to be lowered into the well through the drilling fluid, said pipe being closed

against the entrance of the drilling fluid, means at lower end of the pipe for receiving a sample includin inlet opening into the pipe, means carried by the pipe sealing the well above the inlet, said sealing means ada to be positively pressed against the walls of the form to seal off the same, and a valve for the inlet that ma positively opened and closed by movement of the while the well is sealed above the inlet.

18. A method of testing the productivity of a fo tion encountered in a well containing drilling fluid in ing the insertion of only a single string of pipe into well to make a test, which includes lowering a test s into the well through the drilling fluid with a packer ried by the string and a valve inlet at the lower en the string closed against the entrance of fluid from well, setting the packer above the formation and ope the valve to permit cognant fluid from the format enter the inlet, closing the valve to prevent the subse entrance of fluid from the well through the inlet releasing the packer, and raising the test string with inlet closed against entrance of fluid from the w remove an entrapped sample.

19. An apparatus for testing the productivity formation in a well containing drilling fluid, compr a string of pipe to be lowered into the well through drilling fluid to adjacent the formation to receive a sample therefrom and to be raised out of the well t move the entrapped sample, said pipe being closed ag the flow of the drilling fluid as the pipe is lowered the well, a packer carried by the pipe as the pipe is low into the well and adapted to be seated by manipulatio the pipe to seal off the well above the formation,

packer adapted to be positively pressed against the walls of the formation to seal off the same, an inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well.

5. That the plaintiffs, Erle P. Halliburton and Halliburton Oil Well Cementing Company, recover from the defendant Johnston Formation Testing Corporation the profits and damages arising out of or accruing from the infringement by the defendant Johnston Formation Testing Corporation of the Letters Patent in suit, and that this cause be referred to.., Esq., as Special Master *pro hac vice* to ascertain such profits and damages and report the same to the Court, upon which accounting the Special Master shall ascertain and report as to whether or not in fact and law the defendant E. C. Johnston should be held personally liable for the payment of such profits and damages in the event of a failure of the defendant Johnston Formation Testing Corporation to pay the same.

6. That the plaintiffs Erle P. Halliburton and Halliburton Oil Well Cementing Company recover from the defendant Johnston Formation Testing Corporation the costs and disbursements in this suit in the sum of............ Dollars, to be taxed and that plaintiffs have execution therefor.

Dated this 5th day of September 1935.

Randolph Bryant
United States District Judge.

APPROVED AS TO FORM:

Ben F. Saye
Leonard S. Lyon
Henry S. Richmond
Attorneys for Plaintiffs.

8-23-35 Copy received but not approved.

D. A. Simmons, for Defendants

....

....

....

Attorneys for Defendants.

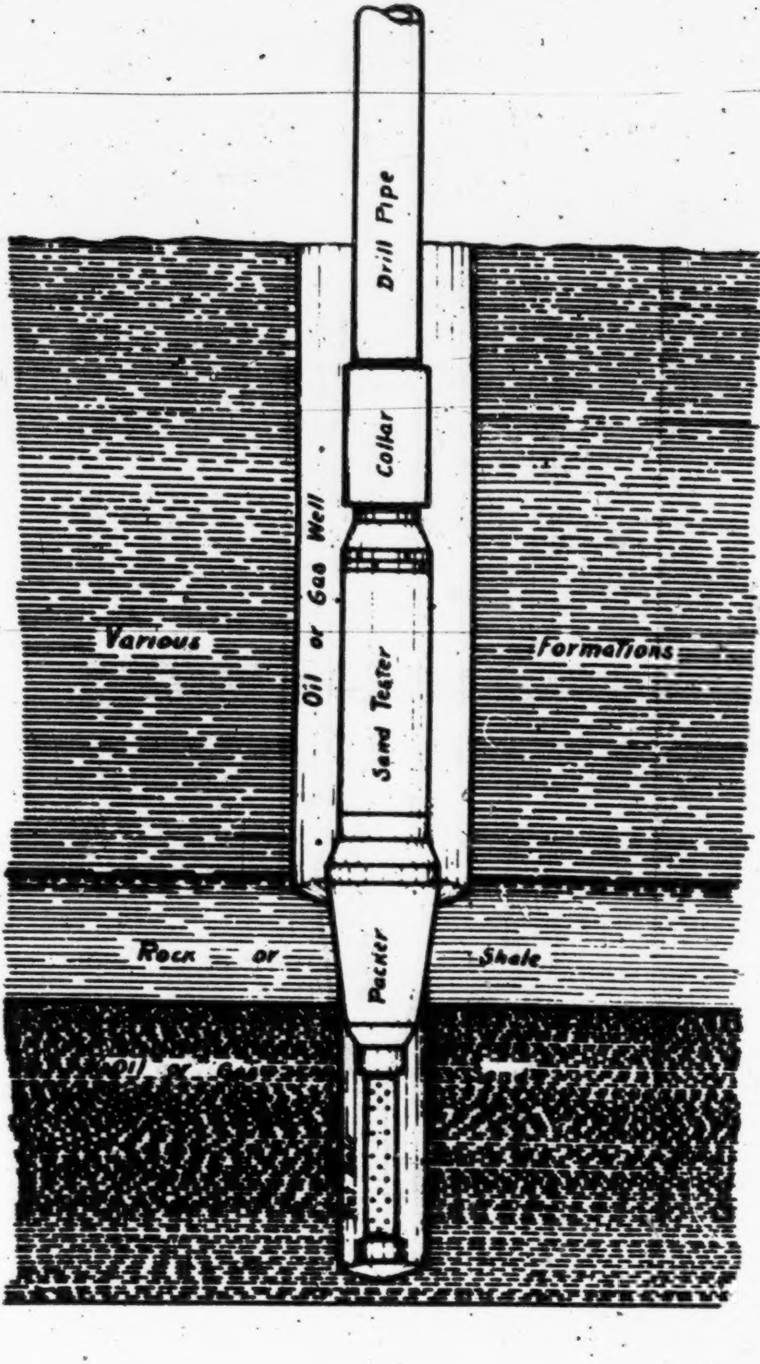
UNITED STATES OF AMERICA)
) ss:
Eastern District of Texas)

I, Helen Mathews, Clerk of the United States District Court in and for the Eastern District of Texas, do hereby certify that the annexed and foregoing is a true and full copy of the original Interlocutory Decree, in the case of Erle P. Halliburton and Halliburton Oil Well Cementing Company vs. Johnston Formation Testing Corporation, a corporation and E. C. Johnston, No. 693 In Equity, Tyler Division. now remaining among the records of the said Court in my office.

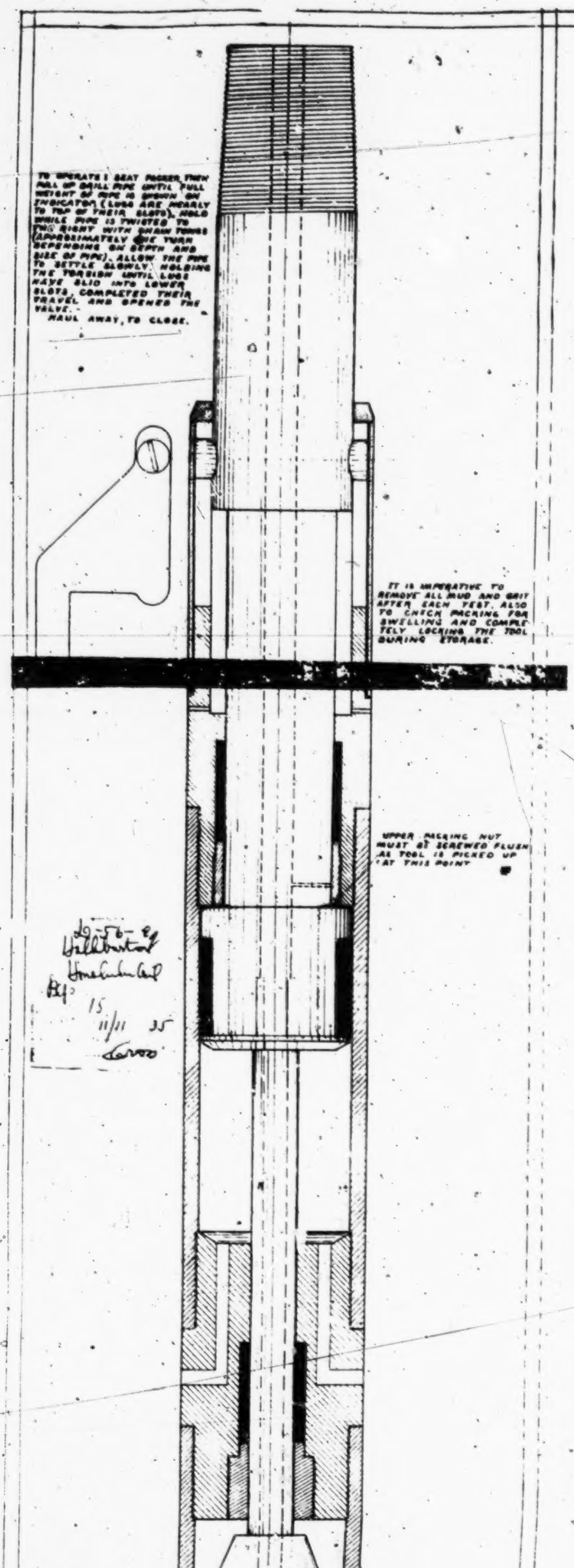
IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the seal of the aforesaid Court at Sherman, Texas this 5th day of September, A. D. 1935

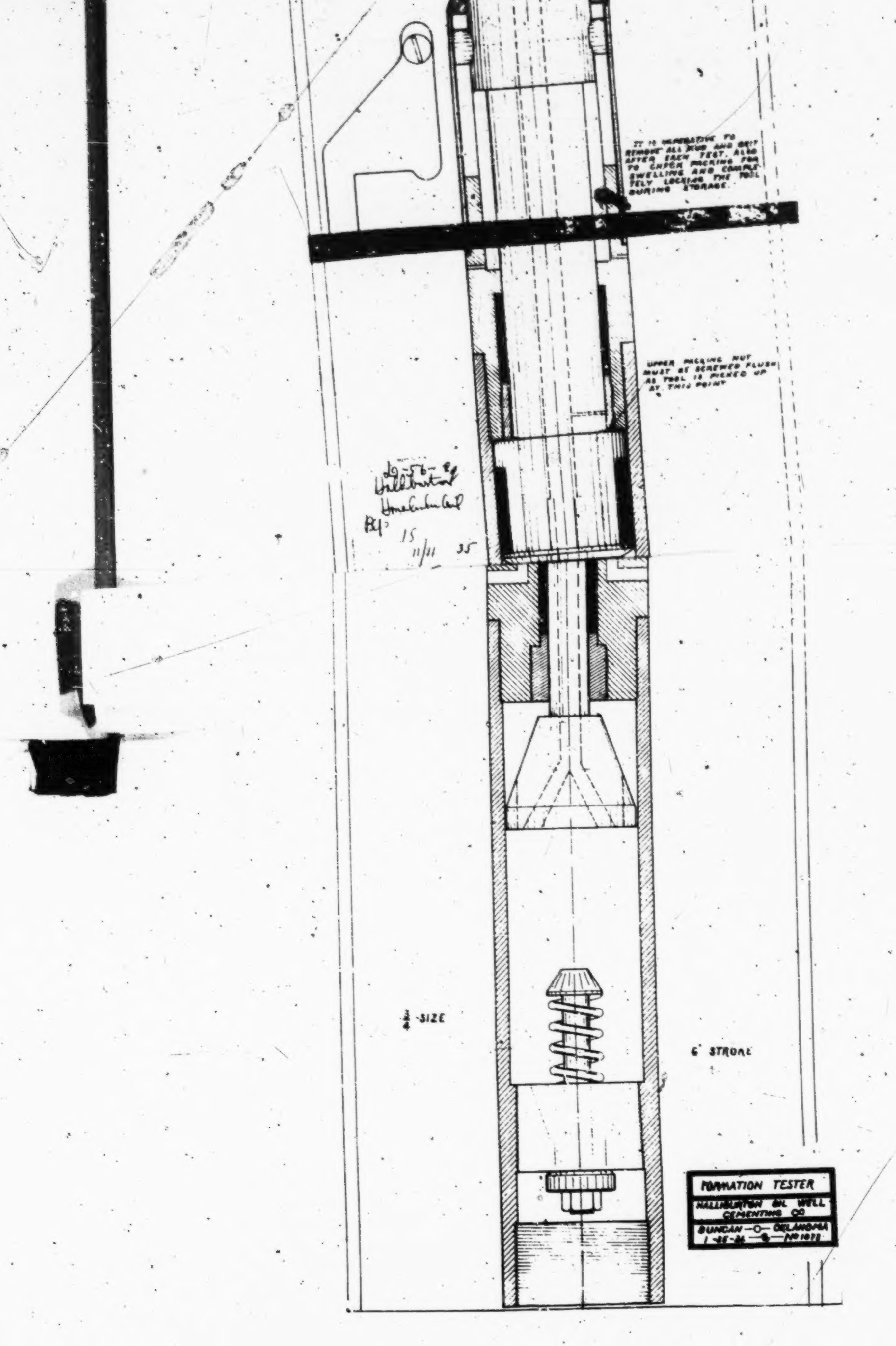
[Seal] Helen Mathews Clerk.
By F. Z. Edwardson Deputy Clerk.

No. D-56 Eq. Halliburton et al vs. Honolulu Oil Corp. Plfs Exhibit No. 6 Filed 11/11 1935. R. S. Zimmerman, Clerk By Cross, Deputy Clerk in evid 11/21/35


Drill Pipe
Collar
Oil or Gas Well
Various
Formations
Sand Tester
Rock or Shale
Packer
Oil or Gas

10A


TO OPERATE: SEAT PACKER, THEN PULL UP DRILL PIPE UNTIL FULL WEIGHT OF PIPE IS SHOWN ON INDICATOR (LUGS ARE NEARLY TO TOP OF THEIR SLOTS), HOLD WHILE PIPE IS TWISTED TO THE RIGHT WITH SWAN TONGS (APPROXIMATELY ONE TURN DEPENDING ON DEPTH AND SIZE OF PIPE). ALLOW THE PIPE TO SETTLE SLOWLY, HOLDING THE TORSION UNTIL LUGS HAVE SLID INTO LOWER SLOTS, COMPLETED THEIR TRAVEL AND OPENED THE VALVE.-
HAUL AWAY, TO CLOSE.
IT IS IMPERATIVE TO REMOVE ALL MUD AND GRIT AFTER EACH TEST. ALSO TO CHECK PACKING FOR SWELLING AND COMPLETELY LOCKING THE TOOL DURING STORAGE.
UPPER PACKING NUT MUST BE SCREWED FLUSH AS TOOL IS PICKED UP AT THIS POINT
15
11/11 35


IT IS IMPERATIVE TO REMOVE ALL MUD AND GRIT AFTER EACH TEST. ALSO TO CHECK PACKING FOR SWELLING AND COMPLETELY LOCKING THE TOOL DURING STORAGE.
UPPER PACKING NUT MUST BE SCREWED FLUSH AS TOOL IS PICKED UP AT THIS POINT
3/4 SIZE
6" STROKE
FORMATION TESTER
HALLIBURTON OIL WELL CEMENTING CO
DUNCAN — OKLAHOMA

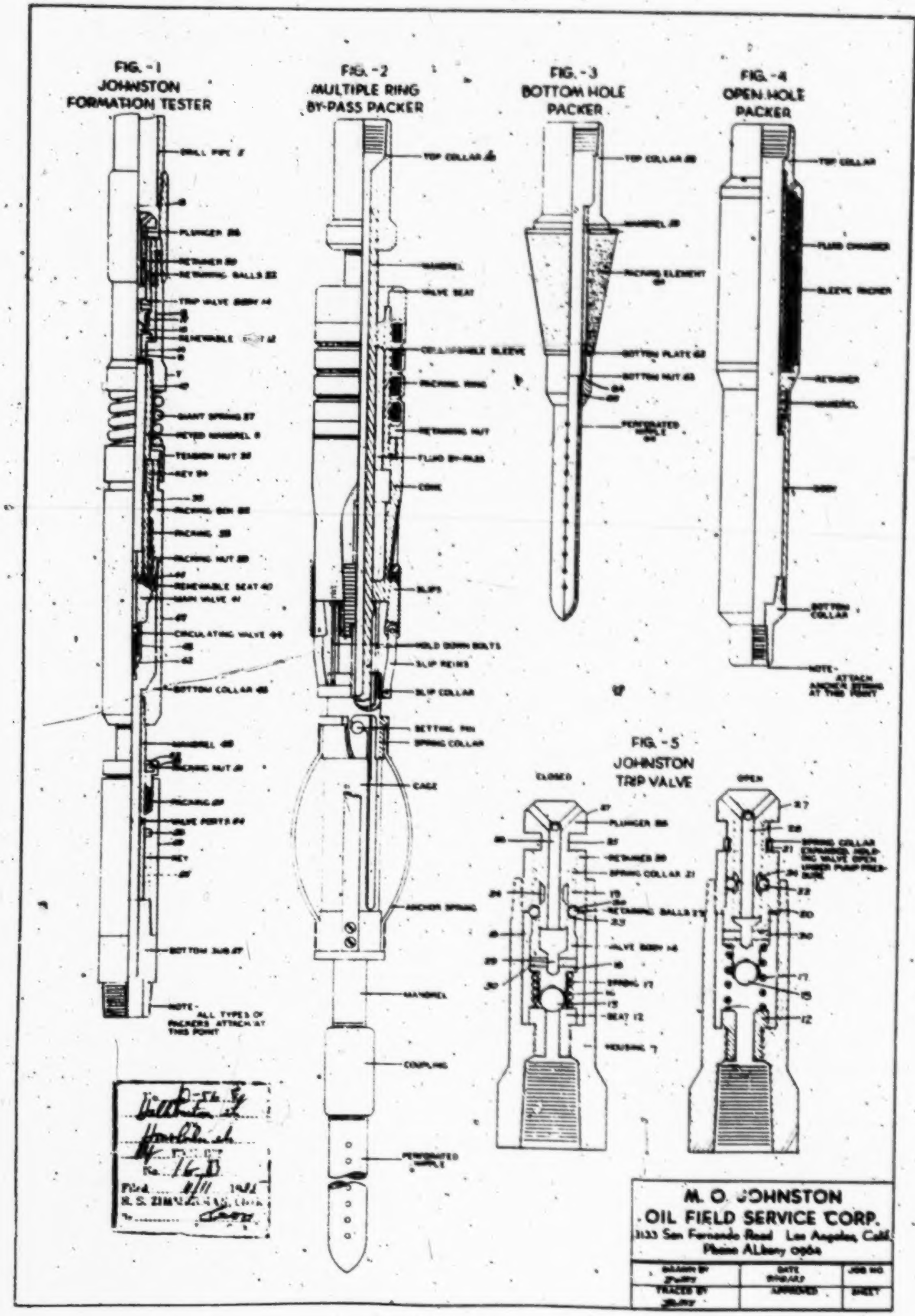
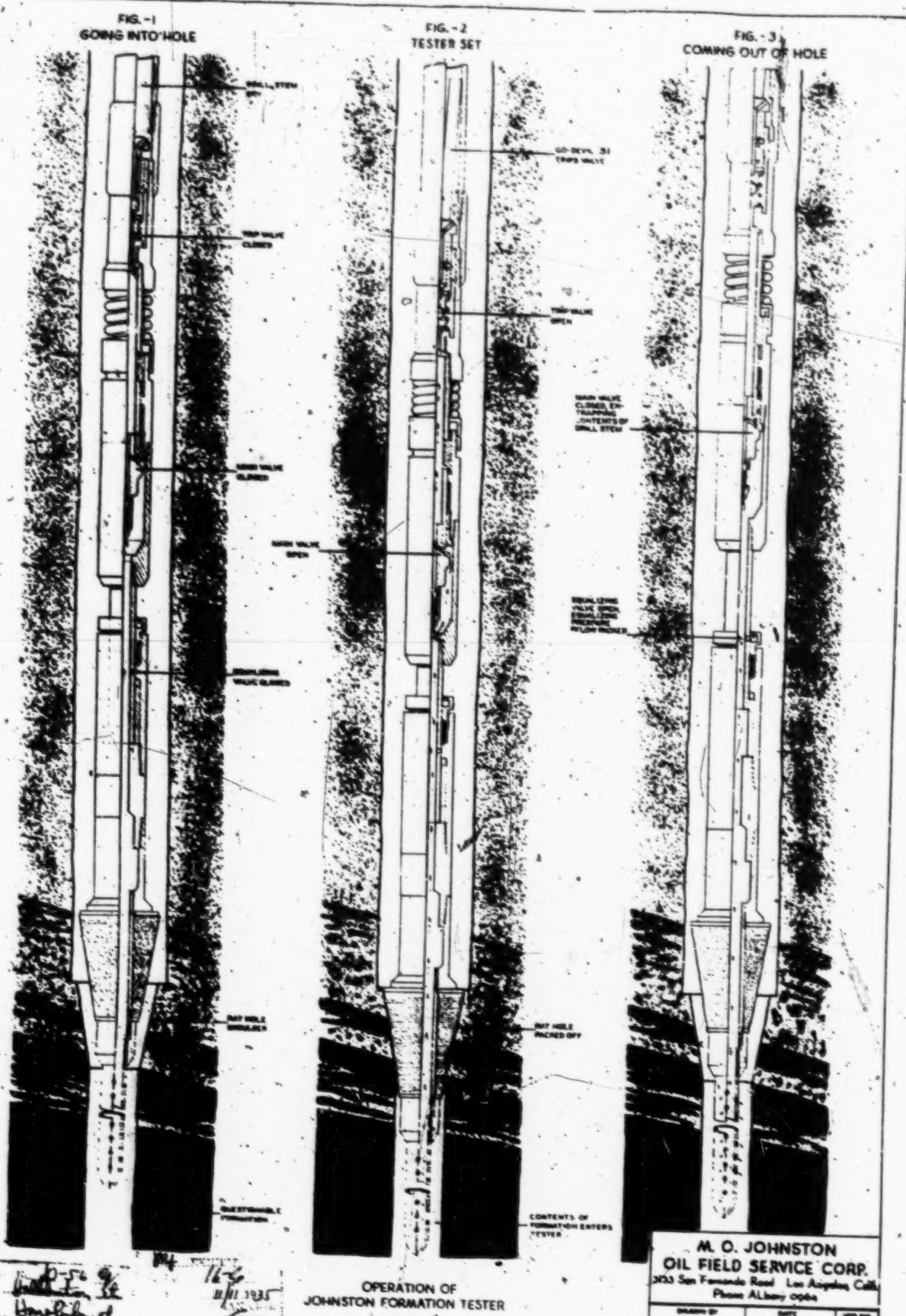


FIG. -1
JOHNSTON
FORMATION TESTER
FIG. -2
MULTIPLE RING
BY-PASS PACKER
FIG. -3
BOTTOM HOLE
PACKER
FIG. -4
OPEN HOLE
PACKER
DRILL PIPE
PLUNGER
RETAINER
RETAINING BALLS
TRIP VALVE BODY
RENEWABLE SEAT
GIANT SPRING
KEYED MANDREL
TENSION NUT
KEY
PACKING BOX
PACKING
PACKING NUT
RENEWABLE SEAT
MAIN VALVE
CIRCULATING VALVE
BOTTOM COLLAR
MANDREL
PACKING NUT
PACKING
VALVE PORTS
KEY
BOTTOM SUB
NOTE-
ALL TYPES OF
PACKERS ATTACH AT
THIS POINT
TOP COLLAR
MANDREL
VALVE SEAT
COLLAPSIBLE SLEEVE
PACKING RING
RETAINING NUT
FLUID BY-PASS
CONE
SLIPS
HOLD DOWN BOLTS
SLIP REINS
SLIP COLLAR
SETTING PIN
SPRING COLLAR
CAGE
ANCHOR SPRING
MANDREL
COUPLING
PERFORATED NIPPLE
TOP COLLAR
MANDREL
PACKING ELEMENT
BOTTOM PLATE
BOTTOM NUT
PERFORATED NIPPLE
TOP COLLAR
FLUID CHAMBER
SLEEVE PACKER
RETAINER
MANDREL
BODY
BOTTOM COLLAR
NOTE-
ATTACH
ANCHOR SPRING
AT THIS POINT
FIG. -5
JOHNSTON
TRIP VALVE
CLOSED
OPEN
PLUNGER
RETAINER
SPRING COLLAR 21
RETAINING BALLS
VALVE BODY
SPRING 17
SEAT 12
HOUSING
SPRING COLLAR
Filed
R. S. ZIMMERMAN
M. O. JOHNSTON
OIL FIELD SERVICE CORP.
3133 San Fernando Road Los Angeles, Calif.
Phone ALbany 0664
DRAWN BY
DATE
JOB NO.
TRACED BY
APPROVED
SHEET

Exhibit B



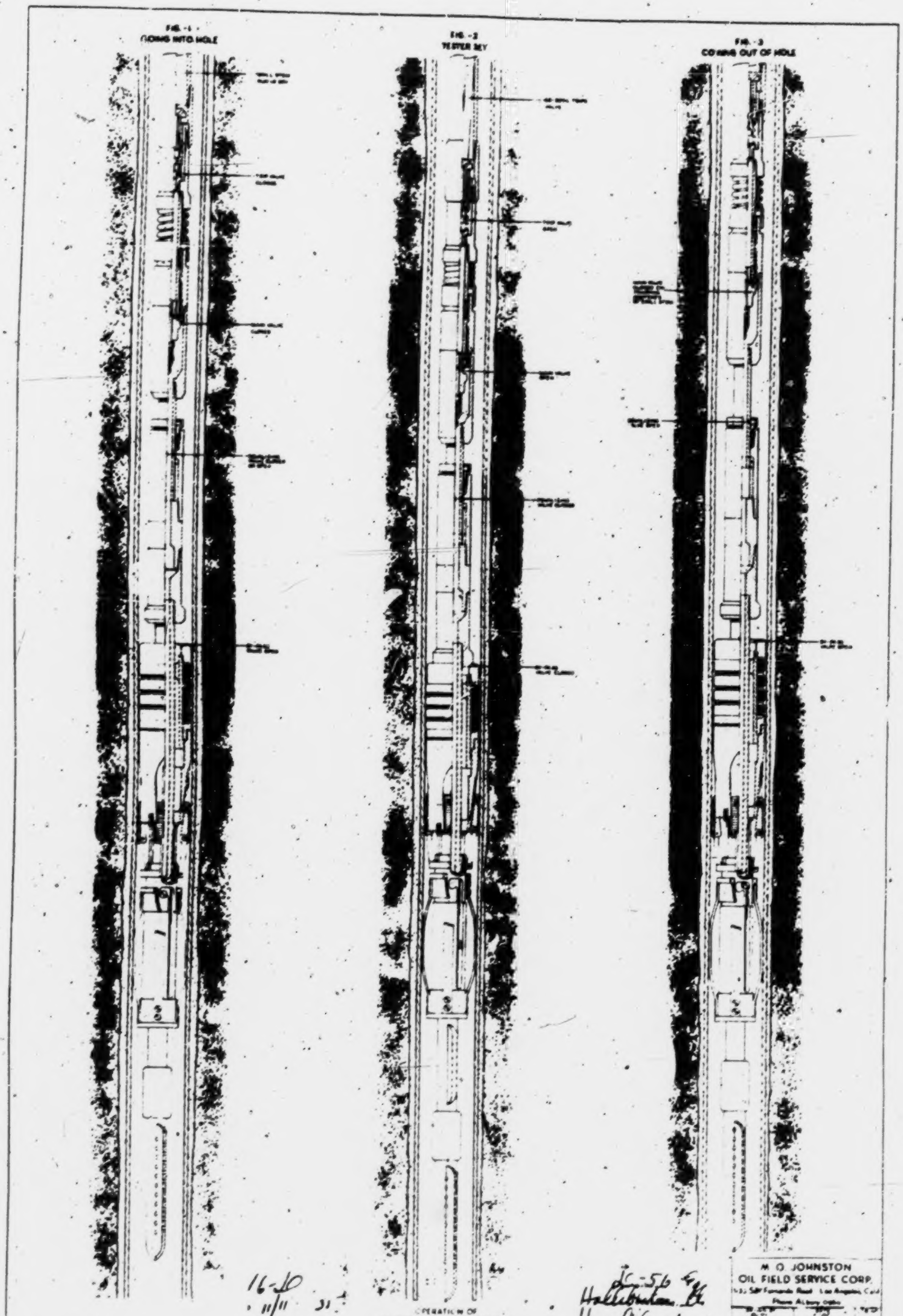
OPERATION OF
JOHNSTON FORMATION TESTER

M. O. JOHNSTON
OIL FIELD SERVICE CORP.
3933 San Fernando Road Los Angeles, Calif.
Phone ALbany 0964

DRAWN BY	DATE	JOB NO.
TRACED BY	APPROVED	SHEET

11/11/1935

EXHIBIT C



OPERATION OF
JOHNSTON CASING TESTER

EXHIBIT D

[PLAINTIFFS' EXHIBIT No. 17.]

ssrs. Lyon & Lyon,
orneys at Law,
ional City Bank Building,
Angeles, California.

Sherman, Texas.
July 6, 1935.

orable Ben F. Saye,
rney at Law,
can, Oklahoma.

srs. Simmons & Arnold,
rneys at Law,
ston, Texas.

srs. Saye & Saye,
rneys at Law,
gview, Texas.

orable Benjamin F. Bledsoe,
Hill, Morgan & Bledsoe,
rneys at Law,
Roosevelt Building
Angeles, California.

: Erle P. Halliburton and Halliburton Oil Well Cementing Company v. Johnston Formation Testing Corporation, et al. Equity No. 693, Tyler Division.

lemen:

ter full consideration of the above entitled matter, e concluded that John T. Simmons is the sole, only original inventor of the testing device or apparatus ed by the patent in suit. That the patent belongs to Halliburton as the assignee of the inventor, and that xclusive license to operate under the same has been rred upon the Halliburton Oil Well Cementing pany.

#2.

That the patent is valid as to both the apparatus method claims. That the defendants have infringed u plaintiff's rights and that plaintiffs are entitled to re in the usual form.

In view of the full review of this matter by the Pat Office, which has been made a matter of record here I have decided that it would be superfluous effort for to attempt to write an opinion in this matter.

Accordingly, attorneys for the complainant may p pare and submit to opposing counsel proposed forms findings of fact and conclusions of law, and final form decree in accordance with the above indications.

If counsel cannot approve of these matters as to for I shall be glad to settle the form of the same upon noti of that fact.

I wish to say to you gentlemen frankly, that this ca has caused me more trouble and concern than any oth that I have ever tried, but if there is error in the resu reached, I trust that you gentlemen will see that it corrected.

Very truly yours,

Randolph Bryant

No. D-56-Eq Halliburton vs. Honolulu Plf Exhibi No. Plf. 17 Filed 11/21 1935 R. S. Zimmerman, Clerk By Cross, Deputy Clerk

Jno. T. Simms Co. Jan, 22, 1926

IN ACCOUNT WITH

EBY ENGINEERING COMPANY

SAMUEL H. EBY, C. E.

El Dorado, Ark.

20	1	Special Drawing 3 Blue Prints	11.00

Paid
EBY ENGINEERING COMPANY
Per. C. L. Phillips

D-56 Halliburton v. Johnston et al
11/21/35
R. S. Zimmerman, Clerk
By Marie E. Carr, Deputy

Halliburton v. Johnston
Equity #693
Plaintiff's Exhibit "8"

PRIOR FRANKLIN PATENT 263,330

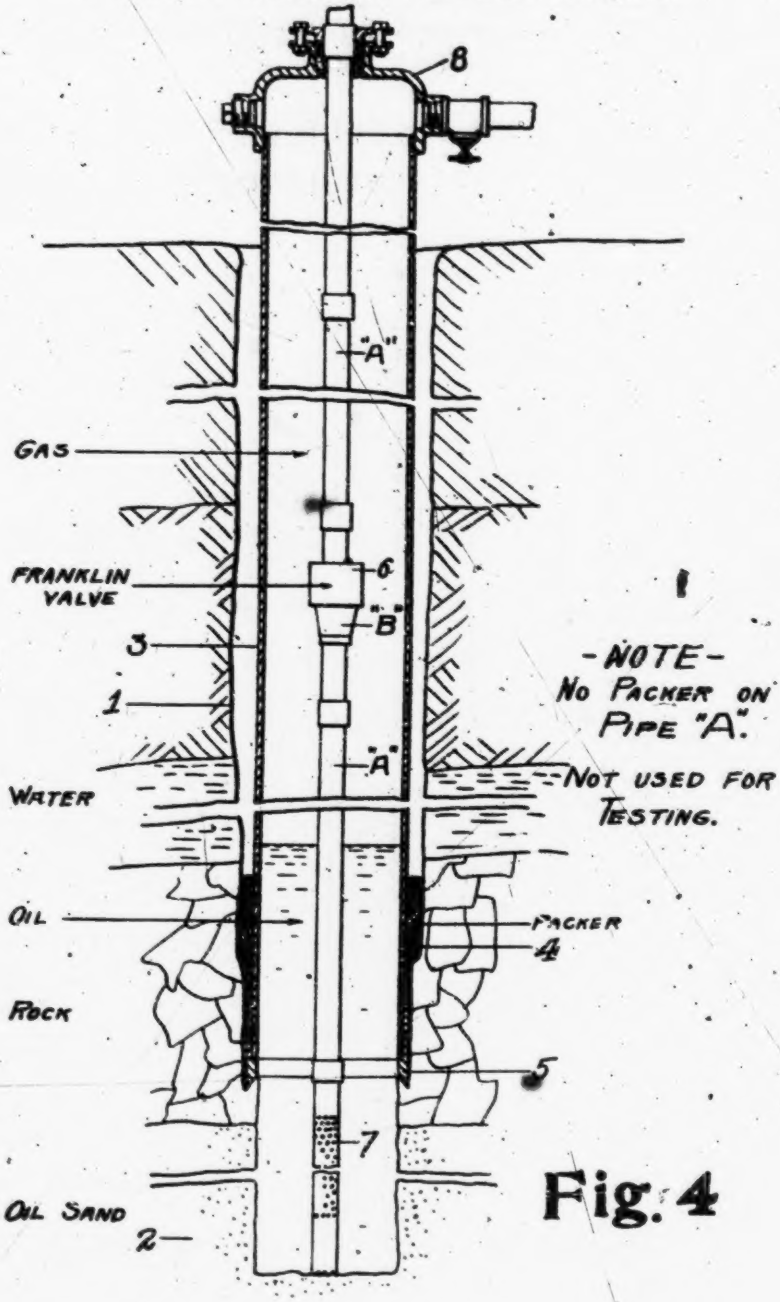


Fig. 4

H-E TOOLS

Spears, Overshots and Flow Testers

Can Rotate with strain, more pull, more grip. Can release at will. No adjustments to make.

The flow test is the only reliable test.

Don't buy casing until the well is flow tested with an Edwards Flow Tester.

Position of slip when released.

Pltf. EXHIBIT No. 20

Filed 11/21 19

ZIMMERMAN, Clerk

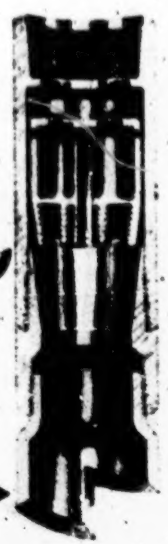
Deputy Clerk

Large Pipe Connection to run over blank joint.

Position of slip when in contact with pipe collar; slots in line with keys.

Slip held up by keys in released position.

Interchangeable Shoe



At Your Supply Store

HOUSTON ENGINEERS, Inc.

Phone Preston 1927 — Night, Taylor 1996

Postoffice Box 276

HOUSTON, TEXAS

ALL PRODUCTS SHOWN IN THIS AD PATENTED OR APPLIED FOR

H-E TOOLS

H-E TOOLS

Reversing Tools and Casing Cutters

Insure Satisfactory Service

These tools were developed after years of actual contact with all kinds of difficult fishing jobs by experienced engineers.

Coupling for drill stem connection rotates to right.

Note powerful hinged wings. When turned to right open and anchor to casing—causing

The lower part to operate to the left, recovering stuck or twisted off pipe and casing.

Can be released at will. Will operate with strain on pipe. Has wide range of adjustment. Makes left-handed pipe unnecessary. Successful operations prove statements.

When you find it necessary to use left-handed pipe, save the expense and use the EDWARDS REVERSING TOOL.

Save the Casing Seat! Dont Risk Side Track!

Use an Edwards Cut and Pull Inside Casing Cutter and avoid water troubles. Cuts and pulls at one trip.

No mandrel—Use drill stem only.

REVERSING TOOLS, INSIDE CUTTERS, OUTSIDE CUTTERS, SPEARS, JARS, OVERSHOTS, TAPER AND BOX TAPS, FLOW TESTERS AND OTHER SPECIALTIES.

At Your Supply Store

HOUSTON ENGINEERS, Inc.

Phone Preston 1927 — Night, Taylor 1996
Postoffice Box 276
HOUSTON, TEXAS

H-E TOOLS

CHAS. R. EDWARDS, PRESIDENT — CHAS. W. MARKLE, VICE-PRESIDENT — TRACY T. WORD, SECRETARY-TREASURER

HOUSTON ENGINEERS, INC.

POST OFFICE BOX 276

xclusive licensees and owners of the Reversing Tools
nd Releasing Fishing Tools, formerly manufactured by
he Mark Manufacturing Company of Houston, Texas.

PHONE PRESTON 182
NIGHT TAYLOR 1[illegible]

HOUSTON, TEXAS

Halliburton v. Johnston
Equity #693
Plaintiff's Exhibit "30"

NEW AND IMPROVED FIELD EQUIPMENT

Device Tests Stratum With Drill Stem in Hole

A device used on the drill stem, ot test the oil flow possibilities of any promising stratum while drilling, has been designed by Chas. R. Edwrads, president of the Houston Engineers, Inc., Houston, Texas.

In fact it is claimed that with this device the mud pumps can maintain the mud circulation through the rotating drill stem while the oil is actually flowing to the surface of the ground through the test tube from an oil bearing stratum at the bottom of the well.

Oil Tester for Wildcat Wells

The cut herewith shows the tester in vertical cross-section. The upper section is the blowout preventer swivel used above the rotary table. The pump connection is through a tee side opening just below the blowout preventer, and above the elevator connection which is immediately above the upper swivel gland.

The tester proper is shown in the lower part of the cut, and at the very bottom of the cut is shown a packer. This may be any suitable open hole packer such as is now on the market. Above the packer connection is the lower swivel. At the top of the lower part of the cut is the drill stem lower connection.

Two sections of the test tube are shown. For four-inch drill stem with standard tool joints, the test tube is usually of one and one-fourth inch tubing. At the lower end of the test tube is a section of perforated tubing with very small perforations. At the upper end of the perforated section of the inside of the test tube is a knock-out plug.

The bottom of the lowest test tube is beveled to make a tight joint in the lead seal shown at upper end of the perforated joint of the test tube.

Arrows inside the test tube show the mud circulation courses.

The packer is set and the test tube seated in the lead seal. This separates the well into two compartments.

The lower compartment can be opened into the test tube by dropping a light go-devil into the empty test tube breaking the knock-out plug at the top of the perforated bottom joint of the test tube. This is equivalent to instantly bailing the well dry so far as the lower compartment is concerned.

The oil and gas, if any, now being suddenly relieved of the enormous mud pressure can flow up to the surface through the test tube, giving the operator, it is claimed, positive knowledge of not only its presence, but its quality and quantity as well as the gas pressure, thus directing him how to prepare to handle the well in the proper way.

It is claimed that this device will shorten the time and very greatly lessen the expense of wildcatting and thoroughly test a lease as every foot of the hole can now be flow tested without setting screen and casing.

The test is made by actually flowing the oil from the well if present in the stratum tested.

It is also claimed that the time required to flow a test well in this manner is very little more than that required to run a core barrel, and the expense of this method is less than that of coring since from 50 to 100 feet of structure may be flow tested.

Additional information can be had from the Houston Engineers, Incorporated, P. O. Box 277, Houston, Texas.

Casing Cutter Combined With Reliable Grapple

A Casing Cutter combined with reliable grapple that pulls the cut off section of casing at the same trip the cut is made has been designed by Chas. R. Edwards, president of the Houston Engineers, Inc., of Houston, Texas.

The cutters, of the well known wheel type, are driven out and withdrawn, by a reliable rack and gear movement. This type of drive also makes it possible to cut the smaller sizes of casing.

An interlock located between the casing grapple and the cutters controls the cutters that they remain inoperative while rotating and washing down. The interlock is released only when an upward strain is taken on the casing.

This, it is claimed, is a very important feature; the upward strain carrying the weight of the casing about to be cut relieves the cutters of the entire weight of the casing above. Thus cutter breakage is reduced to a minimum and the main objection to the use of casing cutters is overcome.

Houston Casing Cutter and Grapple

Provision is made to give the operator notice as soon as the casing is cut in two.

Ample provision is made to release the casing hold if more casing is cut off than can be pulled.

A new cut can be made by simply moving up or down to a new location and taking a new hold. This is accomplished without coming out of the well, there being no triggers or trips about this casing cutter that require hand resetting after a casing hold has been made.

A great deal of time and expense is also saved by being able to rotate down, wash down, cut and pull the cut off casing at one trip.

Further information will be supplied by the Houston Engineers, Inc., P. O. Box 276, Houston, Texas.

[DEFENDANT'S EXHIBIT A.]

DEPARTMENT OF COMMERCE

United States Patent Office

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of the File Wrapper, Contents and Drawings, in the matter of the abandoned

Application of
Erle P. Halliburton,

Filed December 28, 1926, Serial Number 157,573,

for

Improvement in Well Testing Device.

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this fourth day of October, in the year of our Lord one thousand nine hundred and thirty-five and of the Independence of the United States of America the one hundred and sixtieth.

(Seal
Attached)

Attest:
D. E. Wilson
Chief of Division.

Conway P. Coe
Commissioner of Patents.

Number (Series of 1925) PATENT NO

157573 ~~1927~~ Dated

Div. 38 1926 Ex'r's Book) J 2

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Division of App. No. ...., filed ...., 19........

Name ERLE P. HALLIBURTON

of LOS ANGELES

State of CALIFORNIA

Invention WELL TESTING DEVICE

ORIGINAL

Application Filed Complete Dec 28, 1926

Parts of Application Filed

Petition, Specification,
Oath, First Fee $20,
2 sheets Drawings, } Dec 28, 1926

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Examined and passed for Issue ...., 192

.... Exr. Div. ....

Notice of Allowance ...., 192

By Commissioner

Final Fee ...., 192

RENEWED

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Reexam'd and passed for Issue......................., 192

.... Exr. Div. ....

Notice of Allowance ...., 192

By Commissioner.

Final Fee ...., 192

Attorney LYON & LYON 708 NATIONAL CITY BANK BLDG LOS ANGELES CALIF

Associate Attorney...

No. of Claims Allowed .... Print Claims..................

in O. G. Class...

Title as Allowed..

[Stamped]: $20- Rec'd Dec 28 1926 C.C.U.S. Pat. Offi

CK C

Frederick S. Lyon
Leonard S. Lyon

Henry S. Richmond
George H. Hiles
Richard F. Lyon
Francis D. Ammen
Lewis E. Lyon

Telephone
FAber 31

Law Offices

LYON & LYON

PATENT AND TRADEMARK CAUSES

National City Bank Building
Los Angeles

December 23, 1926.

Commissioner of Patents,
Washington, D. C.

Dear Sir:

Enclosed herewith find the application of Erle P. Hal burton for United States Letters Patent on WEI TESTING DEVICE; also our check No. 1790 for $20. in payment of the filing fee thereon.

Kindly file, acknowledge receipt, and oblige,

Yours very truly,

B-Encl.

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[Stamped] Mail Room Dec 28 1926 U.S. Patent Office
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Petition and Power of Attorney

To the Hon. Commissioner of Patents:

Your petitioner, ERLE P. HALLIBURTON, a citizen....of the United States, residing at Los Angeles, in the County of Los Angeles, and the State of California, whose post-office address is Duncan, Oklahoma, prays that letters patent may be granted to him for the WELL TESTING DEVICE, set forth in the annexed specification, and....he....hereby appoints the firm of

Lyon & Lyon

(the individual members of which firm are Frederick S. Lyon and Leonard S. Lyon), 708 National City Bank Building, Los Angeles, California his attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent and to transact all business in the Patent Office connected therewith.

Inventor sign full name: { Erle P. Halliburton

Specifications

To All Whom it May Concern
Be it know that

157573 2

I, ERLE P. HALLIBURTON, a citizen of th United States, residing at Los Angeles, in the Count of Los Angeles, State of California, have invente a new and useful

WELL TESTING DEVICE,

of which the following is a specification:

This invention relates to an apparatus for testin the productivity of formations encountered in drillin oil and other deep wells, and refers particularly to a apparatus to be employed when such wells are drille by the rotary method.

In the rotary method of drilling wells, the well kept filled with a mud-laden fluid. In most wel drilled by the rotary process, it is impossible withou danger to the hole to remove the mud-laden fluid with out providing some other support to prevent the wal of the well from collapsing. The hydraulic pressur of the mud-laden fluid in the well is very great, bein often in excess of 2000 pounds per square inch. I most instances, this pressure is in excess of the hea upon the cognate fluids, either oil, water, or gas, en countered in the formations penetrated by the dril Under these circumstances while drilling, there ma be no indication whatever at the surface of the wel of the productivity or even existence of such cognat fluids. It is therefore necessary to perform a specia testing operation whenever it is desired to

determine whether a formation in a well contains a fluid which, upon removal of the pressure of the mud-laden fluid, will enter the well bore.

It is the general practice when making such a test to set a string of casing or plurality in strings in the well so that such string of casing may support the walls of the well when the mud-laden fluid is withdrawn. If a water sand has been encountered above the formation to be tested, it is necessary to run in a separate string of casing and cement or otherwise seal its bottom to the sides of the well bore at a point below the known water level in order to protect the formation being tested from this upper water strata. In testing the well, the hole below the bottom of this water string is then protected by another string set inside of the water string. The mud-laden fluid is then removed from the well.

In case the test develops that the formation tested is barren or not commercially productive or contains water, and it is therefore desired to deepen the hole, it is necessary to refill the hole with mud-laden fluid, to remove if possible the inner string, and to resume drilling. The cemented string of casing must be left in the hole, which not only entails the cost of this string of casing, but decreases the size of the hole which can thereafter be drilled.

An object of the present invention is to provide an apparatus for testing formations encountered in well drilling which apparatus may be employed without the necessity of removing the mud-laden fluid from the well bore and which apparatus may be employed without the necessity of cementing off any

of the water strata above the formation to be tested. The device of the present invention is designed to provide an empty conduit leading from the formation to be tested to the top of the well, which conduit is closed from communication with the mud-laden fluid of the well and is adapted to be opened and closed from the top of the well to establish as desired communication with the formation to be tested. The apparatus of the present invention provides means by which the mud laden fluid in the well may be packed off from the formation to be tested.

Another object of the present invention is to provide a device for testing a well which may be readily operated from the surface of the well without substantial danger of the device being frozen within the well hole, and also provide a device which is self-cleaning and hence will not become clogged.

Another object of the present invention is to provide a device through which continuous production from the well may take place when the pressure on the fluids within the well is sufficient to elevate the fluid to the surface of the well, and at the same time provide a means by which, when the pressure on the fluids of the well is insufficient for this purpose, such fluids may be positively trapped within the testing device and removed to the surface of the well where an indication of the quantity and quality of such fluids may be had.

The present invention together with various further objects and advantages thereof will best be understood from a description of a preferred form or example of an apparatus or device embodying the invention. For this purpose, there is hereafter described the preferred type of well testing device

embodying the present invention. Such device is illustrated in the accompanying drawings, in which:

Figure 1 is an elevation showing the device in position in a well hole, the well hole and parts of the apparatus being in vertical section,

Figure 2 is an enlarged vertical elevation mainly in section of the lower end of the testing device,

Figure 3 is a similar view at right angles to Figure 2, the lower end being broken away,

Figure 4 is a section on the line 4-4 of Figure 2,

Figure 5 is a section on the line 5-5 of Figure 2,

Figure 6 is a section on the line 6-6 of Figure 2, and,

Figure 7 is a section on the line 7-7 of Figure 2.

Referring to the drawings, the apparatus is illustrated as consisting mainly of the following elements: A casing 2 which may be formed in a plurality of sections held together by couplings 3, or other means adapted to provide an empty chamber or a conduit which may be lowered into a well bore such as 4, and when so lowered provide an empty chamber adjacent the formation 5 to be tested. The apparatus also comprises a valve 6 normally closing the lower end of said casing or conduit 2, and below said valve is provided an inlet line 7. There is also provided packing means 8 above the inlet line 7 by which the mud-laden fluid within the well may be shut off from the inlet end of the device.

The inlet member 7 is formed by a casing, the upper portion 9 of which mounts the packing 8. The packing 8 is indicated as tapering downwardly and may be formed of any suitable packing material. The lower end of the packing engages a follower 10 which is held upon the casing 9 by a collar 11. The lower end of the inlet member 7 is formed by a perforated casing 12 which operates as a screen for the fluid entering the testing device. The perforated section 12 is held to the upper section 9 by the collar 11 and the lower end of the perforated section 12 is closed by the cap 13.

The collar 11 also serves to mount a bearing 14 and the cap 13 serves to mount a bearing 15. Said bearings support an eccentric shaft 16 which forms part of a means for automatically cleaning the perforations of the screen section 12. The upper end of said shaft 16 mounts an impeller 17 adapted to be auto-

matically rotated by fluid passing upwardly through the device and the eccentric portion of the shaft 16 supports a plurality of rotary perforation cleaning elements 18 which are indicated as formed in the shape of star wheels, the individual arms 19 of which are spaced apart corresponding to the spacing of the perforations in the screen pipe 12 so that said devices 18 may rotate around the perforations successively, punching and cleaning the same out. It is understood that this automatic cleaning device is adapted not only for use in connection with the present testing device but is adapted for use wherever it is desired to employ a self-cleaning screen pipe or casing in a well.

The upper section 9 of the inlet member is threaded to a box on a body member 20 which also engages the upper end of the packing 8. Said body member 20 has a vertical bore 21 therethrough, and the valve 6 is positioned in this bore 21. Said valve 6 comprises a tapered plug 22 adapted in one position to close the passage 21, and having a transverse passage 23 which is adapted to be rotated into register with the passage 21 for opening the same. The plug 22 of the valve 6 is integral or rigid with a gear 24 by which the valve may be opened and closed.

The valve body 20 and supported inlet member 7 are swivelly connected to the casing or conduit 2 and for this purpose, the conduit 2 is threaded to a head 25 by its pin 26. A bearing, such as the ball race 27, is provided between the body 20 of the valve and the head 25 and the lower end of the head 25 is provided with a bevel gear 28 which meshes with the gear 24 of the valve 6 whereby relative rotation between the head 25 and the body 20 will rotate the valve 6.

To support the valve body and inlet tube upon the head 25, the head 25 is provided with a shoulder 30 and a sleeve 31 is threaded to the body 20 and extends up enclosing the valve, and bearings 27, to above the shoulder 30 where said sleeve is threaded to a member 33 engaging said shoulder. Said member 33 also serves as a packing box receiving packing 34 held down by a packing gland 35, which prevents the entrace of mud-laden fluid. Above the gland 35, a split tapered collar 36 is bolted in place which eliminates any sharp shoulder on the top of the device which might otherwise catch upon any obstructions in the well hole.

The head 25 is provided with a vertical bore 37 aligning with the bore 21 of the valve body 20, which bore 37 receives a tube 38 which is threaded to the valve body 20 and extends up to near the top of the head 25. Said tube is there engaged by packing 39 compressed by a gland 40 in the head 25. The gland 40 is also attached to a tubing 41 of considerably less outer diameter than the inner diameter of the casing 2, and said tubing 41 extends upwardly for a considerable distance.

The sleeve 31 also supports a stop member 42 in the form of a pin threaded therein, which engages an arcuate slot 43 in the head 25 and provides a means for limiting the relative rotation between the head 25 and valve body 20 so that at the limits of said relative rotation, the body 20 will be in the maximum open and maximum closed positions.

The device is preferably operated or employed in the following manner: Whenever it is desired to test a formation in a well, there is first drilled in the formation 5 to be tested a hole 50 of less size than the adjacent well bore, which reduced

size hole is ordinarily referred to in the art as a "rat hole". The inlet member 7, valve body 20, and head 25 and connected parts are then attached to the lower end of the casing, such as 2, with the valve 6 in the closed position. At this time, the device above the valve 6 is empty of any fluid except, as indicated at 51, a quantity of fluid may be placed between the tubing 41 and the casing 2. This fluid is for the purpose of assisting in the support of the lower end of the casing 2 from collapsing under the heavy hydraulic pressure of the mud-laden fluid indicated at 52 in the well. It is understood, however, that generally in the use of the invention, the tubing 41 and liquid 51 is not necessary and is only employed when the device is to be utilized to test an extremely deep well where the hydraulic pressure of the mud-laden fluid 52 therein may be in excess of the strength of the casing 2. Where the hydraulic pressure of the mud-laden fluid in the well is in excess of the strength of the casing 2, the tubing 41 is positioned in place extending sufficiently high within the casing 2 to reach above the point where such hydraulic fluid is in excess of the strength of the casing 2, and the fluid 51 is placed between this tubing 41 and casing 2 up to near the upper end of the casing 2.

The device is then lowered into the well hole without removing the mud-laden fluid 52 except as such mud-laden fluid is displaced by the device with the addition of further sections of the casing 2 as the lowering process requires until the packing 8 is landed upon the upper end of the rat hole 50 so that such packing will shut off the mud-laden fluid 52 above said packing from the rat hole 50 therebelow. During the lowering of the testing device into the well hole, care should be taken to

agitate the mud-laden fluid within the well bore as little as possible in order to prevent the wall of the well hole from being washed down upon the testing device and freezing the same within the well hole.

The engagement of the packing 8 and top of the rat hole not only excludes the mud-laden fluid from the rat hole but anchors the valve body 20 in place. Thereafter the pipe or casing 2 may be rotated to open the valve 6 and the fluid in the rat hole will enter the screen section 12 of the inlet member 7 and ascend through the valve 6 in the testing device. When the pressure upon the fluids of the formation is sufficient, such fluid will continue to ascend through the casing 2 to the top of the well, and continuous production from the well may thus be had. Where the pressures on the formation 5 are insufficient for this purpose, the fluid will rise in the casing 2 to a height dependent upon such pressure. After the fluid has been permitted to enter the testing device for sufficient period of time to rise to a height to counterbalance the pressure upon the fluids in the formation 5, the casing 2 is again rotated to close the valve 6 after which such fluid is positively trapped in the device above the valve 6 and the device may be then removed from the well hole. As soon as the packer 8 is unseated from the top of the rat hole 50, the mud-laden fluid is reimposed upon the fluids within the formation 5, thereby preventing the further escape of such fluids. Upon the elevation of the device to the top of the well, the height of fluid in the testing device will indicate the pressure upon the fluids within the well and will permit a determination of the yield of such fluids which can be expected from such formation.

It is understood that during the removal of the device from the well, mud-laden fluid is added to the well bore to maintain the same filled so that the hydraulic pressure necessary to prevent the hole collapsing is at all times maintained within the well.

During the entrance of fluids from the formation 5 into the well testing device, such fluids contact with the impeller 17, rotating the screen cleaning device so that the star wheels 18 successively punch out each of the perforations in the screen section 12 of the inlet member, automatically maintaining such openings free.

While the device for testing wells herein described is well adapted for carrying out the objects of the present invention, it is understood that various modifications and changes in the details of the device may be made without departing from the present invention, and the present invention includes all such modifications and changes as come within the scope of the following claims.

RFL:LR

I claim:

[Written in margin]: McConnell Insert B1

1. An apparatus for testing the productivity of formations in a well comprising a conduit adapted to be lowered into a well to the formation, means swivelly carried by said conduit and adapted to be anchored in the well, a rotary valve for said conduit, and inter-engaging

)B1

gears carried by said anchoring means and conduit respectively, said gears being connected to actuate said valve.

2. An apparatus for testing the productivity of formations in a well, comprising an empty conduit adapted to be lowered into a well to the formation, a packer swivelly carried by said conduit, a rotary valve adjacent the lower end of said conduit, and inter-engaging gears connected to said conduit and said packer, said gears being adapted to operate said valve.

[Written in margin]: xB Insert B2

3. An apparatus for testing the productivity of formations in a well, comprising an empty conduit adapted

to the formation to be tested

to be lowered into said well$_\wedge$, a head attached to the lower end of said conduit, a valve body swivelly carried by said head, packing means carried by said body, inter-

)B2

engaging gears between said body and head, and a valve for closing the inlet to said conduit connected to be actuated by said gears.

[Written in margin]: Woods no invention Insert B3

4. A device for testing the productivity of formations encountered in a well, comprising a conduit adapted to be lowered to a well formation, a head carried by said

)B3

conduit, a valve body swiveled to said conduit, ^ a valve carried by said body and adapted to be operated by relative movement between said head and valve body, and anti-friction bearing means between

157573 13

said body and head.

[Written in margin]: Per B Insert B4

5. An apparatus for testing the productivity of formations encountered in a well, comprising a conduit

to the formation to be tested

adapted to be lowered into a well^, means swivelly carried by said conduit adapted to be anchored in fixed rotary

)B4

position in the well, a valve for said conduit adapted to be operated by relative rotation between said anchor means and said conduit, and anti-friction bearing means between said anchor means and said conduit.

[Written in margin]: Insert B5

6. An apparatus for testing the productivity of fo tions in a well comprising a conduit adapted to be low into the well to the formation, means swivelly carrie said conduit and adapted to be anchored in the we

rotary valve for said conduit, inter-connecting gears nected to said anchor means and said conduit adapte actuate said valve, and anti-friction bearing means tween said conduit and anchor means.

[Written in margin]: Insert B6

7. An apparatus for testing the productivity of for tions in a well comprising a conduit adapted to be low into a well to the formation, said conduit being cl from liquids within the well, a tube at the lower enc said conduit adapted to enter a rat hole in the format

a valve operative to establish communication between tube and said conduit, and gears connected to said t and conduit adapted to actuate said valve by relative r tion between the tube and conduit.

8. An apparatus for testing the productivity of for tions in a well comprising a conduit adapted to be l ered into a well to the formation, said conduit be closed from liquids

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[Written in margin]: B7

within the well, a tube at the lower end of said conduit adapted to enter a rat hole in the formation, a valve

)B7

operative to establish communication between said tube and said conduit, gears connected to said tube and conduit adapted to actuate said valve by relative rotation between the tube and conduit, and anti-friction bearing means between said tube and conduit.

9. An apparatus for testing the productivity of formations in a well comprising a conduit adapted to be lowered into a well to the formation, said conduit being closed from liquids within the well, a tube at the lower end of said conduit adapted to enter a rat hole in the formation, a valve operative to establish communication between said tube and said conduit, and gears connected to said tube and conduit adapted to actuate said valve by relative rotation between the tube and conduit, said tube being connected with packing means adapted to engage the upper part of the rat hole and seal the formation from hydraulic pressure of liquid standing within the well.

10. An apparatus for testing the productivity of formations in a well comprising a conduit adapted to be lowered into a well to the formation, said conduit being closed from liquids within the well, a tube at the lower end of said conduit adapted to enter a rat hole in the formation, a valve operative to establish communication between said tube and said conduit, gears connected to said tube and conduit adapted to actuate said valve by relative rotation between the tube and conduit, and anti-friction bearing means between said tube and conduit, and tube being connected with packing means adapted to engage the upper part of the rat hole and seal the formation from hydraulic pressure of liquid standing within the well.

[Written in margin]: Aggregation

~~11. In an apparatus for testing the productivity of formation encountered in a well, means adapted to lowered into a well and provide an empty chamber adj cent the formation to be tested, a valve adjacent th lower end of said chamber for opening and closing sa chamber, means for operating said valve from the to of the well, a screen for the inlet to said conduit, an means propelled by the fluid entering the conduit fo cleaning said screen.~~

[Written in margin]: Do 12 pr D

~~12. In an apparatus for testing the productivity a formation encountered in a well, means adapted to lowered into a well and provide an empty chamber a jacent the formation to be tested, a valve adjacent t lower end of said chamber for opening and closing sa chamber, means for operating said valve from the t of the well, a screen for the inlet to said conduit, mea propelled by the fluid entering the conduit for cleani said screen, and means for sealing the formation fro the hydraulic pressure of the fluid standing within t well.~~

[Written in margin]: Do 13

~~13. In an apparatus for testing the productivity a formation encountered in a well, means adapted to lowered into a well and provide an empty chamber a jacent the formation to be tested, a valve adjacent t lower end of said chamber for opening and closing sa chamber, means for operating said valve from the t of the well, a screen for the inlet to said conduit, mea propelled by the fluid entering the conduit for cleani said screen, means for sealing the formation from t hydraulic pressure of the fluid standing within the w and anti-friction bearing means swivelly connecting sa packer and conduit.~~

157573 16

14. An apparatus for testing the productivity of a formation encountered in a well comprising a conduit adapted to be lowered into a well and provide an empty chamber adjacent the formation to be tested, a head for said conduit, a valve body swivelly connected to said head and provided with an inlet tube, gears connecting said head and body, a valve for closing said conduit actuated by said gears, and packing means adapted to engage the upper part of a rat hole in the formation.

[Written in margin]: Edwards? · Cavallaro 524666
166/10 ? tube is part of conduit in either case
Per C

~~15. A device for testing the productivity of a formation encountered in a well comprising a conduit adapted to be lowered into the well and provide a chamber adjacent the formation to be tested, a tube within said conduit at its lower end providing an annular fluid receiving space, a valve for the lower end of said conduit, packing means carried by said conduit, and means for operating said valve from the top of the well.~~

[Written in margin]: Per A

~~16. The screen described comprising a screen tube and a plurality of perforation cleaning members within the tube, and a fluid actuated propeller for operating said cleaning members.~~

~~17. The screen described comprising a casing having a pluarlity of apertures therein and a rotary aperture cleaning member, an eccentric shaft mounting said member, and a fluid operated impeller connected to said shaft.~~

~~18. A screen for a well conduit comprising a casing provided with a plurality of screening apertures, an eccentric shaft within said screen, a propeller connected to the shaft, and a perforating element carried by the eccentric shaft.~~

~~19. A screen for a well conduit comprising a casing provided with a plurality of screening apertures, an eccentric shaft within said screen, a propeller connected to the shaft, and a perforating wheel carried by the eccentric shaft.~~

[Written in margin]: Add D1

157573 18

Signed at Los Angeles, California, this 18 day of Dec 1926

Inventor sign full name: { Erle P. Halliburton

OATH

STATE OF CALIFORNIA }
} ss.
COUNTY OF LOS ANGELES }

ERLE P. HALLIBURTON,

the above named petitioner, being duly sworn, deposes and says that he is a citizen of the United States, and resident of Los Angeles, California; that he verily believes himself to be the original, first and sole inventor or discover of the

WELL TESTING DEVICE,

described and claimed in the annexed specifications, that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application, or in public use or on sale in the United States for more than two years prior to this application; that said invention has not been patented in any country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months prior

to this application; and that no application for patent on said invention has been filed by him or his legal representatives or assigns in any country foreign to the United States ~~except as follows:~~

Inventor sign full name:
Erle P. Halliburton
....

Subscribed and sworn to before me, this 18 day of Dec, 1926

Margaret Bocode

(Impression)
(of Seal Here)

Notary Public in and for the County of Los Angeles, State of California

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[Photostat—Figures 1, 2 and 3.]

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[Photostat—Figures 4, 5, 6 and 7.]

157573 20

[These photostats appear at the end of this file wrapper.]

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DEPARTMENT OF COMMERCE
United States Patent Office
Washington

Address only The Commissioner of Patents, Washington, C.," and not any official by name

All communications respecting this application should give the serial number, date of filing, and name of the applicant

ase find below a communication from EXAMINER in charge of this ap- cation.

March 23, 1927

Thomas E. Robertson
Commissioner of Patents.

P O 11-8623

Applicant: Erle P. Halliburton
Ser. No. 157573
Filed Dec. 28, 1926
For Well Testing Device

on & Lyon,
Nat'l City Bank Bldg.,
Angeles, Calif.

[Stamped]: Patent Office.
Mar 23 1927
Mailed

References made of record:

Waite	68,917	Sept. 17, 1867	166/5	series
McConnell	156,300	Oct. 27, 1874	299/151	
Karns	288,446	Nov. 13, 1883	166/15	
Dixon	431,448	July 1, 1890	210/117	
Hall	600,529	Mar. 15, 1898	166/15	
Chessman	714,146	Nov. 25, 1902	166/15	
McKenzie	788,922	May 2, 1905	210/118	
Smith	1,033,745	July 23, 1912	103/220	
Jergins	1,276,536	Aug. 20, 1918	166/18	
Layne	1,500,829	July 8, 1924	x166/5	
Edwards	1,514,585	Nov. 4, 1924	166/1	
MacCready	1,522,197	Jan. 6, 1925	166/21	

Division is required between Claims (1) 1 to 10, 14 and (2) Claims 16 to 19 inclusive.

Claims 1 to 10 are drawn to a testing device whereas Claims 16 to 19 are drawn to a specific screen including an automatic cleaner and which is an independent invention.

Such claims as 11, 12, and 13 are rejected as aggregations in that they include independent inventions, since the testing device can readily operate without the specific screen, and the specific screen can be attached to any well or well pump tubing or filtering screen. There is no combination between the two devices since each operates independently, each performing its useful function without cooperating in any possible way.

All the claims are rejected on the requirement of division.

TK. C. F. Krafft,

Examiner.

157573 20 R

Serial No. 157573 Paper No. 3
Amendment A

[Stamped]:
Application Div.
May 27 1927
U. S. Patent Office

IN THE UNITED STATES PATENT OFFICE

[Stamped]:
U. S. Patent Office
May 28 1927
Division 18

Erle P. Halliburton, :
Ser. No. 157,573, : Application pending in
Filed Dec. 28, 1926, : Div. 38 – Room 145.
For Well Testing Device. :

The Honorable Commissioner of Patents,
Washington, D. C.

Sir:

Pursuant to Office Action of March 23, 1927, cancel claims 16 to 19 for the purpose of division.

REMARKS

Confirming the oral statement to the Examiner, applicant will arrange to be at the Patent Office on approximately the 15th of June to take up the merits of this application by oral interview. This invention has gone into extended successful use in the oil fields in Oklahoma, Texas, Louisiana, and Arkansas, and its success has attracted others to make unauthorized use of the invention

in competition with applicant. Applicant has a large investment and organization servicing wells by means of this invention and this business requires the early grant of a patent for protection. Applicant requests an action on the merits at the earliest date in order that the issues may be clearly defined at the time of the pending interview. A reconsideration of the rejection of claims 11 to 13 is rquested as applicant does not consider that there is no interdependence and cooperation between the testing device and the type of screen specified. The Examiner

157573 21 R

Erle P. Halliburton 157573 -2-

is requested to hold the rejection of claims 11 to 13 open until applicant can discuss the same at the interview.

Respectfully,

Lyon & Lyon
Attorneys for Applicant

Washington, D. C.
May 27, 1927.

157573 22 R

Div. 38 Room 145 260 Paper No. 4

DEPARTMENT OF COMMERCE

JK/B United States Patent Office

Washington

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name

All communications respecting this application should give the serial number, date of filing, and name of the applicant

Please find below a communication from the EXAMINER in charge of this application.

June 7, 1927

Thomas E. Robertson
Commissioner of Patents

GPO 11-8623

Lyon & Lyon,
708 National City Bank Bldg.,
Los Angeles, California.

Applicant: Erle P. Halliburton

Ser. No. 157573
Filed Dec. 28, 1926
For Well Testing Device

[Stamped]:
Patent Office
June 7 – 1927
Mailed

In response to the amendment filed May 27, 1927.

Additional references made of record:

Woods	535,569	Mar. 12, 1895	166-2

Claims 1, 3, 4, 5, 6, 7 and 8 are rejected on McConnell, of record, who shows a device as defined by the claims. McConnell shows a conduit having a valve and another conduit swivelly carried by the first conduit, and the valve and conduit having inter-engaging means for actuating the valve to establish communication between the conduits. The device of McConnell, including all the elements recited in the claims, must be adapted for performing the functions attributed. By merely adding anti-friction means, applicant accomplished what an ordinary skilled mechanic could accomplish.

Such claims as 4 and 5 can be further rejected on Woods.

Claims 11, 12 and 13 are again rejected as aggregations. Applicant's specific screens can be used in any well device, and the screens do not cooperate in any way with the valve means beside the fact that each of them is useful in the place it is put and remains so independent whether the other part performs its function or not.

Claims 2, 9, 10 14 and 15 appear to be allowable.

TK.

C. F. Kraft
Examiner.

157573 23

This Action Must Be Responded to Within Six Months.

R

Div. 38 Room 145 Paper No. 5

RAB/B

Address only "The Commissioner of Patents, Washington, D. C., and not any official by name

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant

DEPARTMENT OF THE INTERIOR
United States Patent Office
Washington July 13, 1927

Lyon & Lyon,
708 National City Bank Bldg.,
Los Angeles, California.

[Stamped]:
PatentOffice
Jul 13 1927
Mailed

Please find below a communication from the EXAMINER in charge of the application of

Erle P. Halliburton, Ser. No. 157573, Filed December 28, 1926,

For: Well Testing Device.

Thomas E. Robertson
Commissioner of Patents.

6—2681 G P O

The following claims are suggested to applicant for purpose of interference. Failure or refusal to make these claims on or before August 2, 1927 will be taken without

further action as a disclaimer of the invention cover
thereby:

A method of testing the productivity of a formati
encountered in a well containing drilling fluid, which i
cludes lowering a sample chamber into the well throu
the drilling fluid to the formation to be tested, the chamb
being closed against the entrance of fluid from the w
during the lowering operation, sealing off the well abo
the formation to exclude the drilling fluid from the form
tion, opening the chamber to permit cognate fluid fro
the formation to enter the chamber, closing the chamb
against the entrance of fluid from the well, releasing th
seal and removing the chamber so closed to withdraw a
entrapped sample of fluid from below the point at whic
the well was sealed off.

A method of testing the productivity of a formatio
encountered in a well containing drilling fluid, which in
cludes lowering an empty string of pipe into the we
through the drilling fluid to adjacent the formation, th
pipe carrying a packer and having a valved inlet at i
lower end which is closed while the pipe is being lowere
setting the packer above the formation to seal off the dril
ing fluid from the formation, opening the valved inl
after the packer is set to permit cognate fluid from th
formation to enter the pipe, closing the valved inl
against the entrance of fluid from the well by moveme
of the pipe, raising the pipe so closed to remove an e
trapped sample and the packer from the well.

157573 24 R

= 157573--2

A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valved inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognate fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against the entrance of fluid from the well to remove an entrapped sample of the packer.

Apparatus for testing a well comprising string of pipe to be lowered into a well having an inlet at its lower end and carrying a packing for sealing the well above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

Apparatus for testing a well comprising a string of pipe to be lowered into the well, a packer carried by the pipe and means at the lower end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

Apparatus for testing a well containing drilling fluid, which includes an empty string of pipe to be lowered in

the well to adjacent the formation to be tested, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve for controlling the inlet, and means carried by the pipe for sealing the well above the inlet, the valve being positively controlled by movement of the pipe.

Apparatus for testing a formation encountered in a well containing drilling fluid, which includes a single string of pipe to be lowered into the well to adjacent the formation to be tested, a valved inlet at the lower end of the pipe positively controlled from the top of the well by movement of the pipe and a packer carried by the pipe above the inlet.

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes an empty string of pipe to be lowered into the well to adjacent the formation to be tested, a packer carried by the pipe, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe

157573 25 R

and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer carried by the pipe for sealing off the well above the formation an inlet below the packer opening into the pipe, and a valve for the inlet, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

Apparatus for testing the productivity of a formation countered in a well containing drilling fluid, comprising string of pipe to be lowered into the well through the

drilling fluid to adjacent the formation to be tested, mean carried by the string of pipe to permit the flow of cognat fluid from the formation into the pipe, said means includ ing relatively movable parts having passages adapted to b brought into alignment to allow the fluid to flow into th pipe and brought out of alignment to retain the fluid in th pipe, and a packer mounted on one of said parts for seal ing off the drilling fluid from the formation while th passages are aligned.

Apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove the entrapped sample, said pipe being closed against the flow of drilling fluid as the pipe is lowered into the well, a packer carried by the pipe as the pipe is lowered into and removed from the well and adapted to be seated by manipulation of the pipe to seal off the well above the formation, an inlet to the pipe communicating with the wel below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from th formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer i released and the pipe is being raised out of the well.

Apparatus for testing a well containing drilling fluid comprising a single string of pipe to be lowered into th well through the drilling fluid, said pipe being close against the entrance of the drilling fluid, means at th lower end of the pipe for receiving

157573 26 R

a sample including an inlet opening into the pipe, means carried by the pipe for sealing the well above the inlet, and a valve for the inlet that may be positively opened and closed by movement of the pipe while the well is sealed above the inlet.

B.

G. D. G. Nicolson,
Acting Examiner.

[Stamped]: Mail Room Dec 5. 1927 U.S. Patent Office

[Stamped]: U. S. Patent Office Dec 6 - 1927 Division 38

Serial No. 157,573 Paper No. 6

Amendment B

IN THE UNITED STATES PATENT OFFICE

Erle P. Halliburton,)
)
WELL TESTING DEVICE,)
)
Serial No. 157,573,) Division 38, Room 145
Filed December 28, 1926.)

Los Angeles, California.
November 28, 1927.

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

In response to the Office letter of June 7, 1927, we hereby amend as follows:

√Claim 1, line 4, after "well," insert —means car-
B1 ried thereby for sealing off the drilling fluid from the formation to be tested—.

√Claim 3, line 3, after "well" insert—to the formation to be tested—; line 5, after "body" insert
B2 —for engaging the walls of the well and sealing off the formation from the hydraulic fluid in the well—.

√Claim 4, line 3, after "conduit," insert—means
B3 carried by the valve body adapted to pack against the walls of the well for sealing the formation to be tested from the hydraulic fluid thereabove and to anchor the valve body in fixed position—.

√Claim 5, line 3, after "well." insert—to the formation to be tested—; line 4, after "well," insert
B4 —packing means for so anchoring the same and for sealing off the formation to be tested from the hydraulic fluid in the well,—.

√Claim 6, line 4, after "well," insert —packing
B5 means for so anchoring the same and adapted for sealing off the formation to be tested from the hydraulic fluid in the well,—.

157573 28

√Claim 7, line 5, after "formation," insert —pack-

B6 ing means adapted for sealing off the formation to be tested from the hydraulic drilling fluid in the well,—.

√Claim 8, line 5, after "formation," insert —pack-

B7 ing means adapted to seal the well above the inlet from the formation being tested—.

√Cancel claims 11 to 13 inclusive.

REMARKS

As amended, it is believed the Examiner will find the remaining claims allowable. The patent to McConnell clearly does not describe a device which will accomplish applicant's purpose. It merely shows a form of gear driven cock valve. The claims now each specify a means not disclosed in the reference for anchoring and packing or sealing off the apparatus from the drilling fluid in the well. Allowance of all of the claims is requested.

Respectfully submitted,

Lyon & Lyon
Attorneys for Applicant.

RFL:FMC

[Stamped]: Patent Office Jun 23 1928 Mailed

38 Room 145 260 RAB:MEA Paper No. 7

Address only
The Commissioner of Patents,
Washington, D. C.,"
and not any official by name

All communications respecting this application should give the serial number, date of filing, and name of the applicant

DEPARTMENT OF COMMERCE
United States Patent Office
Washington

Please find below a communication from the
EXAMINER in charge of this application.

Thomas E. Robertson
GPO 11-8623 Commissioner of Patents.

June 23 1928

Applicant: Erle P. Halliburton

Ser. No. 157,573
Filed Dec. 28, 1926
For Well Testing Device.

Lyon & Lyon,
708 Natl. City Bnk Bldg.,
Los Angeles, Calif.

Responsive to amendment filed December 5, 1927.

Claim 15 appears to be directly readable on the patent to Edwards of record, and is thereon rejected.

The remaining claims are rejected on McConnell of record, in view of Edwards. Edwards shows the full broad combination in a testing device, including a valve embodied in a coupling member, which valve is operable from the top of the well when the coupling has been lowered therein, a drill stem connected to the upper end of the coupling and a packer and inlet connected to the lower end of the coupling member. McConnell discloses a valve, in the pipe connection of a fluid conduit, of the type disclosed and claimed by applicant. To attach a drill string to one end of said pipe connection or coupling, as in Edwards, and fix a packer to the opposite conduit section, as in Edwards, would not involve invention in view of said Edwards disclosure.

Applicant's claims are further rejected on the interference issue embodied in the claims which were suggested to applicant, in view of McConnell. Applicant's claims do not differ from that subject matter which he has disclaimed, except in the specific form of valve which is shown to be old in McConnell. A use of the McConnell valve in the organization set forth in the interfering claims would not amount to invention.

C. F. Krafft

B. Examiner.

157573 30 R

[Written at top]: #8 C
[Stamped]: Mail Division Dec. 20 28 U.S. Patent Office
[Stamped]: U. S. Patent Office Dec. 21 1928 Division 38

IN THE UNITED STATES PATENT OFFICE

In re application of)
)
ERLE P. HALLIBURTON)
)
WELL TESTING DEVICE) Division 38,
)
Filed December 28, 1926) Room 145
)
Serial No. 157,573)

Los Angeles, California
October 22, 1928

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

In response to the office action of June 23, 1928, amendment is hereby made as follows:

√Cancel Claim 15.

REMARKS

Reconsideration of the rejection of the remaining claims on the references of record is requested.

Considering first the reference Edwards: this reference has been repeatedly explained to the Examiner as not embodying the combination of these claims. The claims suggested in this application by the letter of July 13, 1927, were allowed over the Edwards patent after a full discussion of the differences between the Edwards patent, and such Edwards patent discloses a device which has been established inoperative, for the reason

-1- 157573 31 R

set forth in the affidavits filed by Paul Paine and William A. Doble in Interference No. 55,940 and 55,941.

In said interference, the law examiner has rendered a decision sustaining the claims involved in that interference as patentable over the Edwards patent, excepting solely Count 1, which was so drawn as not to require the use of a single string of pipe carrying the valve and packer on a single testing string. Consistent with the views of the law examiner, and with his own views in allowing the claims forming the basis of that interference, it is thought that the examiner should withdraw the reference Edwards.

In connection with the rejection of the claims on the interference in issue plus McConnell, the following considerations, it is thought, should be applied. The device of McConnell does not relate to a testing apparatus and does not relate to an apparatus for use in the oil industry. These considerations are believed compelling when it is considered that it is necessary to combine this patent in order to make a supposed anticipation of the claims of this application. References from different arts should be combined with caution against the claims of an application.

As brought out in the references before mentioned, the conditions encountered in drilling and operating oil wells are peculiar and the success of an apparatus under the heavy hydraulic heads, gas pressure and other conditions in wells cannot be foreseen merely from its use on a hose nozzle. On a hose nozzle, the fluid

processed does not contain gas under tremendous pressure and the fluid processed does not contain sand and detritus which rapidly cut the parts and tend to work into the valve operating mechanism. Therefore, it is believed that the conditions of operation under which applicant's device is employed are sufficiently different in kind from the conditions of operation of the McConneli nozzle, that a new and different use can be said to have been developed which was not obvious to the art prior to the present invention.

Allowance of all of the claims is requested.

Respectfully submitted,

Lyon & Lyon
Attorneys for Applicant.

RFL-LS

[Stamped]: Mailed Mar 6 1929

Div. 38 Room 345 260 Paper No. 9

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name

All communications respecting this application should give the serial number, date of filing, and name of the applicant

DEPARTMENT OF COMMERCE
United States Patent Office
Washington

Bry/d March 6, 1929

Please find below a communication from the EXAMINER in charge of this application.

Thomas E. Robertson

G P O 11-8623 Commissioner of Patents.

Applicant: E. P. Halliburton

Lyon & Lyon Ser. No. 157,573
708 Natl City Bank Bldg; Filed Dec. 28, 1926
Los Angeles, Calif. For Well testing device

The following claim is suggested in accordance with Section 96, Rules of practice. Failure to make this claim within twenty days following the above date will be deemed a disclaimer of the subject matter.

In a well tester, the combination of a shell having a fluid inlet at the bottom, a valve controlling said inlet, a rotary member in the shell operatively connected to the valve and adapted to be connected to a string of tubing whereby it may be rotated to open and close the valve, and bearings in the shell, to support the weight of said member and the tubing connected thereto.

C. F. Krafft
Examiner.

B.

157573 34 R

[Written at top]: #10 D.

[Stamped]: Mail Division Mar 18 29 U.S. Patent Office

IN THE UNITED STATES PATENT OFFICE

ERLE P. HALLIBURTON)
)
WELL TESTING DEVICE)
) Division 38
)
Filed December 28, 1926) Room 345
Serial No. 157,573)

Los Angeles, California
March 11, 1929.

Hon Commissioner of Patents,
Washington, D. C.

Sir:

In response to the Office action of March 6, 1929, please add the following claim:

[In margin]: D1 per E.

~~20. In a well tester, the combination of a shell having a fluid inlet at the bottom, a valve controlling said inlet, a rotary member in the shell operatively connected to the valve and adapted to be connected to a string of tubing whereby it may be rotated to open and close the valve, and bearings in the shell, to support the weight of said member and the tubing connected thereto.~~

Respectfully submitted,

Lyon & Lyon
Attorneys for Applicant.

RFL-LS

157573 35 R

INTERFERENCE.

"A"

Interference No. 58328 Paper No. 11

Name, Erle P. Halliburton

Serial No. 157,573

Title, Well testing device

Filed, Dec. 28, 1926

Interference with Conner, Powell, Lewis

DECISIONS OF

Law Examiner, Interferences dissolved Dated, Jun 9 1930

Ex'r of Interferences, ... Dated, ...

Board, ... Dated, ...

Commissioner, ... Dated, ...

REMARKS:

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

6 - 1970

157573 36 R

[Stamped]: U. S. Patent Office Interference Div. May 22 1929 Mailed

Div. 38 Room 145 213 Paper No. 12

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name

All communications respecting this application should give the serial number, date of filing, and name of the applicant

Bry/d

DEPARTMENT OF COMMERCE
United States Patent Office
Washington

M GPO 11—8035

Please find below a communication from the EXAMINER in charge of this application "A"

Thomas E. Robertson
Commissioner of Patents

Applicant: E. P. Halliburton

Ser. No........157,573
Filed...........Dec. 28, 1926
For............Well testing device

Lyon & Lyon
Natl City Bank Bldg;
Los Angeles, Calif.

The case, above referred to, is forwarded to the Examiner of Interferences because it is adjudged to interfere with others, hereafter specified. The question of priority will be determined in conformity with the Rules. The interference will be identified as No. 58328 On or before 1 9 1929 the statement demanded by rule 110 must

be sealed up and filed with the subject of invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is

Count 1

In a well tester, the combination of a shell having a fluid inlet at the bottom, a valve controlling said inlet, a rotary member in the shell operatively connected to the valve and adapted to be connected to a string of tubing whereby it may be rotated to open and close the valve, and bearings in the shell, to support the weight of said member and the tubing connected thereto.

The interference involves your application above identified and an application filed by Julian B. Conner for: Flow Tester. Mr. Conner's address is Box 115, Humble, Harris Co; Texas, his attorneys are Hardway & Cathey, Bankers Mortgage Bldg; Houston, TEX., and an application filed by Guy V. Lewis for: Well Testing Device. Mr. Lewis's address is, 1213 Matamoros St; Laredo, TEX., his attorney is J. R. Stone, Union Ntl Bank Bldg; Houston, TEX., and an application filed by Mr. Ernest Powell for: Well tester. Mr. Powell's address is Von Ormy, TEX., his attorney is J. R. Stone, Union Ntl Bank Bldg; Houston, TEX.

The relation of the count of the interference to the claim of the respective parties is as follows:

Count	Conner	Powell	Lewis	Halliburton
1	15	24	24	20

C. F. Krafft Examiner, Division 38.

B.
(Counts compared)

157573 37 R

INTERFERENCE

"B"

Interference No. 58329 Paper No. ~~11~~ 13

Name, Erle P. Halliburton

Serial No. 157,573

Title, Well testing device

Filed, Dec. 28, 1926

Interference with Biggs, Powell, Lewis

DECISIONS ON MOTION

Law Examiner, Interference dissolved as to Biggs
Dated, Mar 6 - 1930

Board of Appeals, ... Dated, ...

DECISIONS ON PRIORITY

Ex'r of Interferences, Favorable Dated, Oct. 20/30

Board of Appeals, ... Dated, ...

Court, ... Dated, ...

REMARKS:

This should be placed in each application or patent involved in interference in addition to the interference letters by Primary Examiner.

157573 . 38 R

11 - 9023 Government Printing Office.

[Stamped]: U. S. Patent Office Interference Div. May 22 1929 Mailed

12.

Div. 38 Room 145 213 Paper No. 14

Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name

All communications respecting this application should give the serial number, date of filing, and name of the applicant

DEPARTMENT OF COMMERCE
United States Patent Office
Washington

Bry/d GPO 11—8035

Please find below a communication from the

EXAMINER in charge of this application "B"

Thomas E. Robertson
Commissioner of Patents

Applicant: Erle P. Halliburton

Lyon & Lyon
Ntl City Bank Bldg:
Los Angeles, Calif.

Serial No.......157,573
Filed..........Well testing device
For................Dec. 26, 1926

The case, above referred to, is forwarded to the Examiner of Interferences because it is adjudged to interfere with others, hereafter specified. The question of priority will be determined in conformity with the Rules. The interference will be identified as No. 58329 On or before Jul 9 1920 the statement demanded by rule 110 must be sealed up and filed with the subject of invention, and name

of party filing it, indorsed on the envelope. The subject-matter involved in the interference is

Count 1

A device for testing the productivity of formations encountered in a well, comprising a conduit adapted to be lowered to a well formation, a head carried by said conduit, a valve body swivelled to said conduit, means carried by the valve body adapted to pack against the walls of the well for sealing the formation to be tested from the hydraulic fluid thereabove and to anchor the valve body in fixed position, a valve carried by said body and adapted to be operated by relative movement between said head and valve body, and antifriction bearing means between said body and head.

The interference involves your application above identified and an application filed by Basil B. Biggs, Jennings, Louisiana, for Well Testers; whose attorney is Browne & Phelps, 2nd Natl. Bank Bldg; Wash; D. C., and an application for Well Tester filed by Ernest Powell, Box 56A, Route 1, Von Orma, Texas, whose attorney is J. R. Stone, Union Natl. Bank Bldg; Houston, TEX; and an application for Well Testing Device filed by Guy V. Lewis, 1213 Matamoras St; Laredo, Texas, whose attorney is J. R. Stone, Union Natl. Bank Bldg; Houston, Texas.

The relation of the count of the interference to the claims of the respective parties is as follows:

Count—	Biggs	Lewis	Powell	Halliburton
1	9	15	25	4

C. F. Krafft
B. Examiner, Division 38.

157573 39 R

INTERFERENCE

Interference No. 58331 Paper No.

Name, Erle P. Halliburton

Serial No. 157,573

Title, Well testing device

Filed, Dec. 28, 1926

Interference with Lewis, Powell

DECISIONS ON MOTION

Law Examiner, ... Dated, ...

Board of Appeals, ... Dated, ...

DECISIONS ON PRIORITY

Ex'r of Interferences, Favorable Dated, Nov. 11 2

Board of Appeals, ... Dated, ...

Court, ... Dated, ...

REMARKS:

This should be placed in each application or patent volved in interference in addition to the interference lett by Primary Examiner.

157573 40 I

[Stamped]: U. S. Patent Office Interference Div. May 22 1929 Mailed

Div. 38 Room 145 213 Paper No. 16

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name

Bry/d

All communications respecting this application should give the serial number, date of filing, and name of the applicant

DEPARTMENT OF COMMERCE
United States Patent Office
Washington

Please find below a communication from the

EXAMINER in charge of this application "D"

Thomas E. Robertson
Commissioner of Patents

Applicant: Erle P. Halliburton

Lyon & Lyon
708 Natl City Bank Bldg;
Los Angeles, Calif.

Serial No.......157,573
Filed..............Dec. 28, 1926
For............Well testing device

The case, above referred to, is forwarded to the Examiner of Interferences because it is adjudged to interfere with others, hereafter specified. The question of priority will be determined in conformity with the Rules. The interference will be identified as No. 58331 On or before Jul 9 1929 the statement demanded by rule 110 must be

sealed up and filed with the subject of invention, and name of party filing it, indorsed on the envelope. The subject-matter involved in the interference is

Count

An apparatus for testing the productivity of formations encountered in a well, comprising a conduit adapted to be lowered into a well/to the formation to be tested, means swivelly carried by said conduit adapted to be anchored in fixed rotary position in the well, packing means for so anchoring the same and for sealing off the formation to be tested from the hydraulic fluid in the well, a valve for said conduit adapted to be operated by relative rotation between said anchor means and said conduit, and anti-friction bearing means between said anchor means and said conduit.

The interference involves your application above identified and an application for Well testing device, filed by Guy V. Lewis, 1213 Matamoros St; Laredo, Texas, whose attorney is Jesse R. Stone, Union Natl Bank Bldg; Houston, Texas, and an application filed by Ernest Powell, Box #56A, Route 1, Von Orma, Texas for: Well tester, whose attorney is Jesse R. Stone, Union Natl Bank Bldg; Houston, Texas.

The relation of the counts of the interference to the claims of the respective parties is as follows:

Count	Lewis	Powell	Halliburton
1	16	26	5

C. F. Krafft Examiner, Division 38

B.

[Stamped]: Mailed Oct 28 1930

Div. 38 Room 145 260 Paper No. 17

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name
kh/d

All communications respecting this application should give the serial number, date of filing, and name of the applicant

Please find below a communication from the EXAMINER in charge of this application.

Thomas E. Robertson
GPO 11—8623 Commissioner of Patents.

Applicant: E. P. Halliburton
157,573

Lyon & Lyon
Ntl City Bank Bldg:
Los Angeles, Calif.

Ser. No. 12/28/26
Filed — Well testing device
For

Additional references made of record:

	Franklin	263,330	Aug. 29, 1882	166/1
(Brit)	Simmons (Ish)	279,175	Oct. 24, 1927	"

The interference #58,328 involving claim 20 having been dissolved on the ground that the count thereof is not patentable in view of the patent to Franklin and the time

for the appeal having expired, claim 20 stands finally rejected.

Claims 1 to 3, 6 to 10 and 14 are rejected as not defining invention over the issue of the proposed claims which applicant failed to make and shown by the British patent to Simmons; over the issue of the interference #58,328; over the patent to Simmons; over the patent to Franklin; in view of the specific valves disclosed by the patent to McConnell.

Applicant's argument as to the impropriety of the combination of the well testing devices with McConnell's valve have been given consideration but it is not thought the adaption of one type of a rotary valve for another, both types of valves being known, amounts to invention. The Simmons and Franklin patents disclose devices which are used for well testing and the lower part has a packer which anchors the device in the well whereby the rotation of the upper string operates some rotary valve and it may well be the type of the valve shown by McConnell. Applicant's argument of November 28, 1927 stating that McConnell does not describe a device which will accomplish applicant's purpose is immaterial and irrelevant because the claims were not rejected on this patent but on such other patents which will accomplish what applicant accomplishes. The valve to McConnell when substituted in these

devices will accomplish everything applicant's valve accomplishes, being the same kind of a valve. Such claims as 6 and some others which include antifriction bearings fail to distinguish from the references because the provision of ball and race bearings for relatively rotary parts is a frequent way of ordinary workmanship such bearings merely helping/the relative rotation of the parts and the provision thereof does not involve invention.

Claims 4 and 5 which were involved in interferences and were decided favorably to the applicant are rejected as failing to define invention over Franklin in merely providing antifriction means between the relatively rotatable parts. Attention of the applicant is called to the fact that the Franklin patent in the motion made in the interference #58,328 has been considered to be a testing tool. The Law Examiner granted the motion and ordered the interference dissolved and applicant did not appeal the decision of the Law Examiner.

The claim is further therefore rejected as not defining invention over the issue involved in the interference #58,328 in merely including antifriction bearings.

It is not thought this case contains patentable matter and applicant should prepare the case for final action.

C. F. Krafft
Examiner

F.K.

B - #18 E.
21/158

[Stamped]: Mail Division Apr 18 31 U.S. Patent Office
[Stamped]: U. S. Patent Office Apr 21 1931 Division 38

IN THE UNITED STATES PATENT OFFICE

ERLE P. HALLIBURTON,)
WELL TESTING DEVICE,) Div. 38, Room 145
Filed Dec. 28, 1926,)
Ser. No. 157,573.)

Los Angeles, Calif.,
April 11, 1931.

Hon. Commissioner of Patents,
Washington, D C.

Sir:—

In response to the Office action of October 28, 1930, please amend as follows:—

Cancel claim 20.

REMARKS

Reconsideration of the rejection of the remaining claims is requested. Before discussing the claims in detail, a short history of the invention and of the prosecution of this application and a companion application in the Patent Office will be helpful to the Examiner.

Applicant in this application is the assignee of Simmons application, Ser. No. 87,323, filed February 10, 1926. The Simmons application is substantially identical with the British Simmons patent No. 279,175, issued October 24, 1927, which is cited as a reference against this application. While the British patent is not a statutory bar because it issued later than the filing date of this application,

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Halliburton, Ser. 157,573.

nevertheless we have no objection, in the prosecution of this case, to the Examiner considering the disclosure of the Simmons British patent, because admittedly that invention is prior to the invention of this application which applicant has always admitted, as shown by his refusal to make the claims suggested in the letter of July 13, 1927, which were taken out of the Simmons application.

The Simmons patent, as established in Interferences Nos. 55,940, 55,941 and 59,515 – in which interferences such Simmons application was involved, discloses the first process and apparatus which could be successfully used in oil wells for taking samples of oil and gas from formations. As shown in the British patent, the original Simmons invention used as a valve two parts 4 and 19, as shown in Fig. 4, which had passages 17 and 18 and 5 and 6 which were intended to be aligned by rotating them into the aligning position. Between parts 4 and 19 there was a ground fit.

This device in operation, while it worked successfully, had the disadvantage that the ground fit between parts 14 and 19 would stick, requiring careful manipulation of the pipe to take some of the weight of the pipe off the part 4. After operating in the early part of 1926 with the Simmons form of tester, the invention of this application was devised in which the ball race 27 is supplied and a plug cock valve 6. These parts were all provided in the apparatus in such a manner as to be protected from fluid in the well. It should be appreciated that

inside of the pipe 2 of the Halliburton apparatus there is no liquid when the device is being lowered into the well, yet outside of the pipe and surrounding the parts housing the ball race and valve liquid pressures exist inasmuch as the device may be lowered 5,000 feet or more below the liquid level in the well. The design and arrangement of a valve and bearing, therefore, which could operate satisfactorily under these severe conditions was a matter requiring a large amount of study and experimentation.

The Simmons application no sooner was allowed by the Examiner than it was thrown into two interferences, involving eight other parties, each of which other parties learned of the invention through public use of the Simmons application, and the admitted purpose of these parties in securing interferences in the Patent Office were merely to harass Halliburton in securing allowance of the Simmons application by bringing motions to dissolve the interferences on the ground that the claims were not patentable.

The references set up were substantially the same as considered by the Examiner in allowing the Simmons application. A decision was entered in these interferences finding the claims of the Simmons application patentable. No sooner had such interference been declared, than a second interference was declared between Simmons' application and the application of another party, who had throughout the prosecution of the earlier interferences been merely standing by to await their outcome. This second party brought another motion to dissolve, setting up the same patents as before and adding the Franklin patent, which is the patent relied upon by the Examiner in this application in his rejection of said claims.

'e have always understood it to be the rule in the nt Office that where the claims of an application have been found allowable by one Examiner they should be rejected by another Examiner on the same refer- s or on any other references, unless the anticipation ee from all possible doubt.

evertheless, in this second interference, the Law niner rendered a decision finding all of the claims of Simmons application unpatentable and without even ioning the prior decision of the previous Law niner.

n appeal was taken from this decision to the Board ppeals in record time, who promptly reversed this de- n and sustained the patentability of the Simmons ap- tion, and very clearly and definitely dispos~~ed of the~~ klin patent as an anticipation. This decision of the d was rendered February 18, 1931.

'ith respect to the Franklin patent the Board stated – 'he apparatus claims 2-10 and 12 have been held un- ntable in view of the disclosure in the Franklin patent dered in connection with Macready. The Franklin nt discloses a device for regulating or controlling the of oil wells. It consists of a valve structure shown igs. 1 and 2 which is intended to be attached to the g of the well preferably above the packer. When ubing is placed in the well or is withdrawn from it alve disk may be close~~d by turning~~ the upper part of ubing and thus prevent flowing of oil. The Exami- of Interferences holds that the lower part of the valve ture, namely part B, could be used as a packer to fit at hole in view of Macready 1,522,197 and thus anti- these counts. We are unable to

take this view. The Franklin patent was not designed to have the part B serve the function of a packer. The part B happens to be somewhat tapered, but otherwise there is no suggestion that it could be used as a packer. Nor do we think that the Macready patent would supply what the Franklin patent lacks. We have noted the statements concerning the Franklin patent made by Judge Hutcheson in his decision involving the Edwards patent. However, the general statement made that the device of Franklin could be modified to be used as a tester gives no clue as to what modifications were contemplated.

* * * * *

"The Franklin structure was devised years before any packers were used and it was never intended to function as a tester when it was constructed."

It is, therefore, clear from the decision of the Board that the Franklin patent was not intended for testing oil wells, but was an apparatus for regulating the flow of oil wells, and, second, that there is no packer in the Franklin device and the addition of parts from other patents to the Franklin device for making out of the Franklin device a well-testing apparatus is not a legitimate manner of anticipating an invention. It is, of course, well settled that an anticipation cannot be made out of ideas extracted from different patents, when no one of the patents shows the combination claim.

We think this decision of the Board of Appeals should also be considered as one condemning the rejection of claims which have already been allowed and thoroughly considered by other Examiners in cases like the present, where a plurality of patents must be aggregated together and, therefore, anticipation is certainly far from clear.

Halliburton, Ser. 157,573.

During the pendency of the Simmons interferences, the Patent Office has proceeded to grant numerous patents to subsequent applicants, including practically all of the applicants who contested such Simmons interferences, on detailed improvement devices, consisting merely in the substitution of spring valves and like things in the Simmons apparatus. At least twenty of such patents have been granted and the names and numbers of them can be furnished if desired. Patents have issued to Johnson, to Neitzel, and many others, yet the present Halliburton application has been very rigidly scrutinized by the Patent Office and was very thoroughly considered before any of the claims were allowed and before interferences Nos. 58,329 and 58,328 were declared. As soon as these interferences were declared, the usual flood of motions to dissolve appeared.

In Interference No. 58,329 a motion was brought to dissolve claim 20 on the ground that such claim was not patentable over patents to Franklin and Edwards. These were the same two patents that were considered in the prior Simmons interferences. There is a great number of reasons that Edwards is not an anticipation, which are unnecessary to consider here.

We have shown that the Franklin patent does not disclose a testing apparatus or process for testing wells, nevertheless claim 20 being an apparatus claim must contain apparatus limitations therein distinguishing from Franklin's apparatus, or it is not patentable. The chief missing element in the Franklin apparatus which

Halliburton, Ser. 157,573.

prohibits its use as a well tester is the absence of a proper packer. Claim 20 contained no such packer. Recognizing, therefore, that claim 20, which has originated from another party's application, was not in proper form and was not patentable over Franklin, even if Franklin did not disclose a well tester, the party Halliburton joined, in effect, in this motion to dissolve and pointed out clearly and specifically to the Law Examiner wherein claim 20 was not patentable. Accordingly, the Law Examiner rendered a decision, in which he stated –

"The count does not recite a packer, and it is, therefore, unnecessary to find an equivalent of a packer in the Franklin patent. The count does not specify that the bearings are independent of the valve structure."

From this history of the Halliburton application, it appears quite clear that applicant is not debarred from urging that Franklin's is not a well testing apparatus, and the Board of Appeals has confirmed applicant's contention in this respect. The Examiner in rejection of claims 4 and 5 tries to, in effect, say that applicant, Halliburton, is, by the decision of the Examiner which found such claims patentable, debarred from urging that they are patentable, merely because with respect to another claim, which is clearly distinguishable, Halliburton has agreed that such claim is not patentable and, in fact, assisted in getting the Examiner to rule that it was not patentable.

Concluding our consideration of the history of these applications, we, therefore, find as follows:–

Halliburton, Ser. 157,573.

(1) That these patents to Franklin and Simmons have been thoroughly considered, and that it has been definitely ruled that the Franklin patent does not diselose an apparatus capable of a well tester;

(2) That the Franklin patent does not disclose any packer; and

(3) That it is is improper to aggregate with the Franklin patent other patents showing valves, packers, etc., to make an anticipation of a well testing device.

Now, the claims here rejected have first been found allowable by the Examiner who caused Interferences Nos. 58,328 and 58,329 to be declared, and the patentability of the claims had been sustained by the decision of the Law Examiners in those interferences.

In the meanwhile, the Patent Office has granted to the parties who have been engaged in merely harassing Halliburton and Simmons a large number of patents on different forms of valve structures to be used in well testing apparatuses. We think it is now time that the Patent Office should accord to Halliburton some degree of fair treatment. The persistence of the Examiners in rejecting Halliburton's application, quite without regard to how many other times the same claims may have been allowed and found patentable by other Examiners over the same references, is not quite understandable. It is quite inconsistent with the action of the Patent Office on other applications for like devices.

McConnell's valve structure has nothing to do with the well testing device. The modification of the

Franklin patent by other patents, such as McConnell, to make out a supposed anticipation is the same form of rejection that was condemned by the Board in its decision in the Simmons interferences. The Simmons application fails to disclose how a valve may be protected from fluid pressure in a well testing device. It provides a device which has the disadvantage that it will stick in operation. It clearly is not an anticipation of the improvements in the specific claims of this application.

With regard to the question of the bearings specified in the claims, attention is called to the fact that the claims are restricted to particular bearings disposed in particular places and having particular effects. This is emphasized by the proceedings in Interference No. 58,329. In that interference, the party Biggs moved to dissolve the interferences as to his disclosure, because his disclosure did not correspond to the count, which was present claim 4 of this application. Biggs contended –

"3rd. That the count of the issue does not read on his disclosure since the anti-friction bearing therein disclosed does not act and is not located between an element responding to the 'valve body' of the claim and an element responding to the recited 'head carried by the conduit' or any other 'head', and that the anti-friction bearing of his disclosure has a totally different function from the corresponding elements in the structures of the other parties, particularly Halliburton in whose file the claim originated."

This limited construction of claim 4 was acquiesced in by Halliburton, who, before the Law Examiner, stated -

Halliburton, Ser. 157,573.

"We agree that Biggs' disclosure does not include the anti-friction bearing means required in the count. While there is located a bearing in the Biggs device, it is not related as required in the count."

Therefore, the Examiner's contention that there is nothing patentable in the claims calling for anti-friction bearings is uncalled for, that the use of bearings is common and has nothing to do with the subject matter of this application. The claims are for a specific use of anti-friction bearings having specific functions. This, and the obvious rule that it is not proper to aggregate together references, no one of which discloses a device capable of the general function of applicant's invention, clearly is sufficient warrant for allowing all of the claims in this application.

In conclusion, we respectfully submit that in the examination of this application the Examiner has followed an unusually vigorous process of repeatedly rejecting claims on grounds which are not proper and which have been thoroughly considered before. The subject matter of the claims of this application has, in effect, been found patentable in numerous instances. We cannot explain to our client why, after all these interferences and all these decisions deciding that claims of this scope are patentable, we should have to further argue the matter. Settled rules of the Patent Office require that these claims be allowed, unless an anticipation can be found which is entirely free from any question of doubt. The

Halliburton, Ser. 157,573.

attempted anticipation sought in this case has been expressly ruled against, in form at least, by the Board of Appeals in the Simmons interference. We ask for a final action.

Respectfully submitted,

Lyon & Lyon
Attorneys for Applicant.

RFL:FE

Div. 38 Room 145 JK:FIS Paper No. 19

DEPARTMENT OF COMMERCE
United States Patent Office
Washington Final Rejection

Address only "The Commissioner of Patents, Washington, D.C.," and not any official by name	All communications respecting this application should give the serial number, date of filing, and name of the applicant

[Stamped]: Mailed Apr 24 1931

Please find below a communication from the EXAMINER in charge of this application.

Thomas E. Robertson
GPO 11-8623 Commissioner of Patents.

Applicant: Erle P. Halliburton

Lyon & Lyon	Ser. No. 157,573
708 Nat'l. City Bank Bldg.	Filed Dec. 28, 1926
Los Angeles, Calif.	For Well Testing Device

Responsive to amendment filed April 18, 1931.

The rejection of claims 1 to 10 and 14 on the references and for reasons of record is repeated.

Applicant's argument has been given a careful consideration and it is not seen that it has merit. The patent to Simmons is a complete reference against the application because applicant refused to enter any interference with the domestic application to Simmons Applicant failed to appeal against the decision of the Law Examiner which held the Franklin patent to be a well tester and applicant is estopped from asserting it now even if in some other

case acting as an assignee he did appeal a decision of the Law Examiner. Furthermore, Franklyn may not be a reference against the Simmons patent but it may become a reference against a later filed application in view of the teachings of Simmons.

The Examiner takes issue with counsel that the rejections of these claims were or are improper or that the previously allowed claims were rejected after allowance thereof without citing new art, or that the patent to Franklyn discovered by one of the interfering parties is not relevant, or that invention would be involved in using the Franklyn device in a manner Simmons uses his even if the claims of Simmons could not have been rejected on Franklyn, or that the changes made in Simmons or Franklyn involve invention in view of the specific valve shown by Connor;

or that other patents were allowed for the same invention as applicant's or that this case has been treated with prejudice as it appears from counsel's argument.

The issues involved are clear and this rejection is made final. An appeal therefrom lies to the Board of Appeals.

TK

C. F. Krafft
Examiner.

IN THE
DISTRICT COURT OF THE UNITED STATES
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION

. . . .

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY, a corporation, Plaintiffs,

\- vs. -

JOHNSTON FORMATION TESTING CORPORATION, a corporation, and E. C. JOHNSTON, Defendants.

IN EQUITY NO. 693.

ON THIS THE 12th day of June, A. D. 1934, came on to be heard the application of defendants in the above entitled and numbered cause for an order of court granting to the said defendants right of access to the archives of the United States Patent Office for inspection and for the procuring of certified copies of documents;

AND IT APPEARING UNTO THE COURT that the above entitled and numbered cause is a suit for alleged infringement of United States Letters Patent No. 1,930,987, issued on October 17th, 1933, to Erle P. Halliburton, as assignee of John T. Simmons, for "Method and Apparatus for Testing the Productivity of Formations Encountered in Wells"; and the Court, having considered the application of the defendants and the affidavit in support thereof to the effect that certain records and documents in the United States Patent Office are material to the defense in this cause, which material records are as follows:

(a) The file wrapper of United States Letters Patent No. 1,930,987, patent applied for by John T. Simmons on February 10th, 1926, in which patent was issued on October 17th, 1933, to Erle P. Halliburton, assignee of John T. Simmons; and

(b) The file wrapper of the Halliburton Stop Cock and Gear Tool Application, Serial No. 157,573, the filing date of which is unknown to defendants, but which was about 1926 or 1927;

THE COURT FINDS that said defendants, JOHNSTON FORMATION TESTING CORPORATION, a corporation, and E. C. JOHNSTON, have a legitimate interest in the said papers and documents described above, which may have a material bearing upon the issues to be litigated in this cause, and finds that it is proper that the said defendants shall have access to the said file wrappers and contents thereof, and should be allowed to secure copies of the said file wrappers and the contents thereof, or any part thereof, upon the payment of the usual and customary fees of the United States Patent Office; and the Commissioner of Patents is accordingly directed to give such access and furnish such documents upon the payment of said customary fees by the defendants, or either of them.

Randolph Bryant

UNITED STATES DISTRICT JUDGE

Approved June 15, 1934

D. E. Wilson

Chief Manuscript and Photoueragraph Division.

Certified Copy D. C. Form No. 30

UNITED STATES OF AMERICA }
Eastern DISTRICT OF Texas } ss:

I, F. A. King, Clerk of the United States District Court in and for the Eastern District of Texas, do hereby certify that the annexed and foregoing is a true and full copy of the original Order allowing defendants access to specified records of the United States Patent office in the case of Erle P. Halliburton and Halliburton Oil Well Cementing Company, a corporation vs. Johnston Formation Testing Corporation, a corporation, and E. C. Johnston, No. 693 In Equity, Tyler Division.

now remaining among the records of the said Court in my office.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the seal of the aforesaid Court at Sherman, Texas this 12th day of June, A. D. 1934

F. A. King
Clerk.

By B Edwards Jr.
Deputy Clerk.

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CONTENTS:

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Government Printing Office

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Serial No 157573 DIV. 38.

2 Sheets Sheet 1

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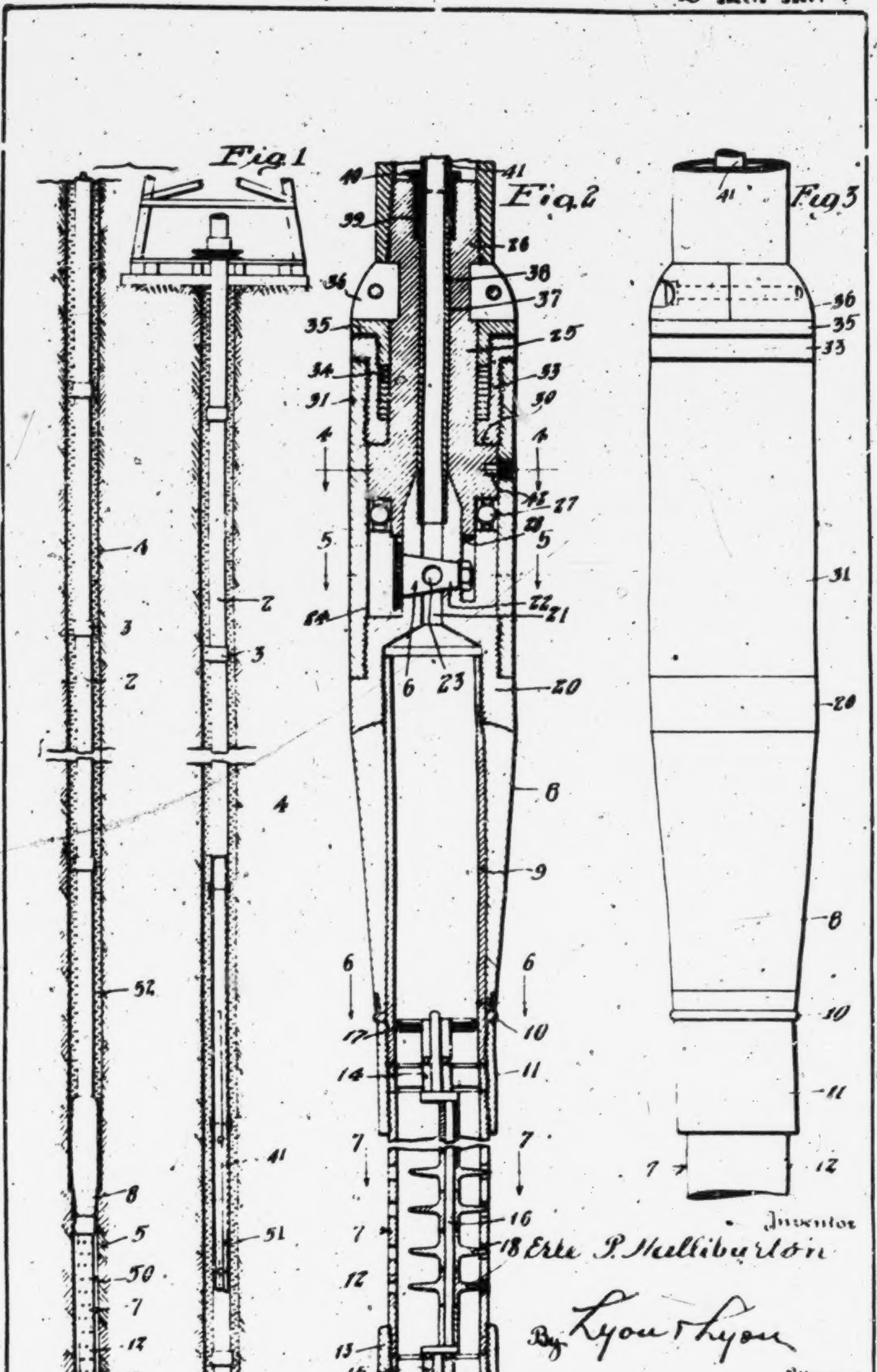


DIV 38

Serial No 157573

2 Sheets Sheet 2

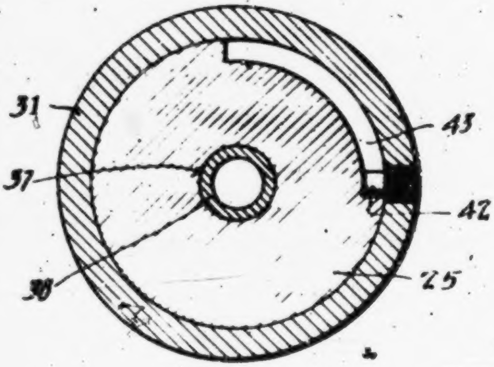


Fig. 4

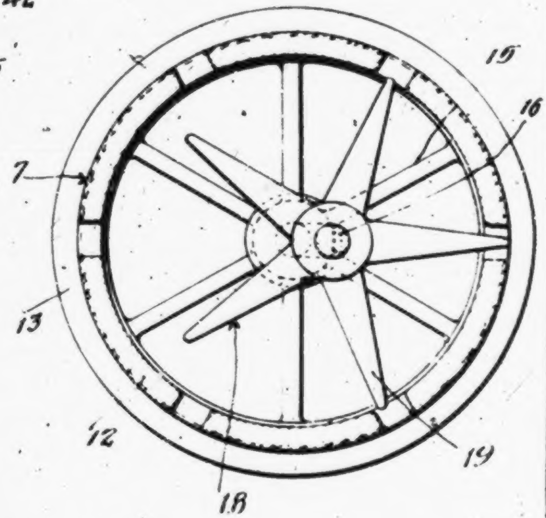


Fig. 7

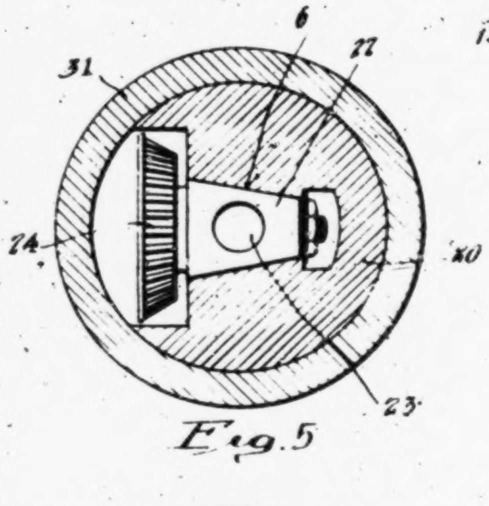


Fig. 5

Fig. 6

Inventor

Erle P. Halliburton

By Lyon & Lyon

Attorneys

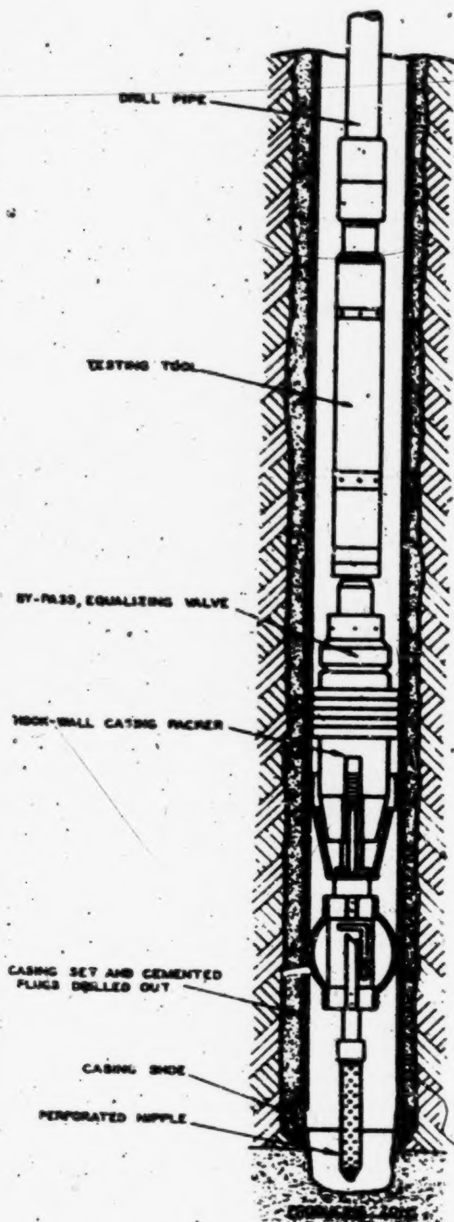
(Photostats.)

[Stamped on Back]: Assembled by P. B. Revised by ....Letter No. James M. Abbett Date 10/2/35 No. D-56- Halliburton vs. Honolulu Deft EXHIBIT No. A Filed 11/11 1935 R. S. ZIMMERMAN, Clerk By Cross Deputy Clerk.

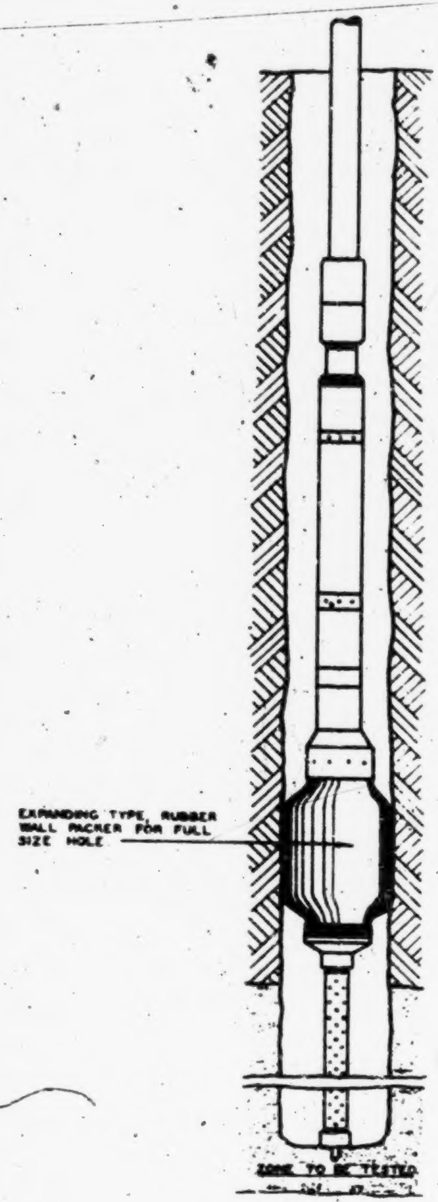
HALLIBURTON OIL WELL CEMENTING CO.

TESTING SERVICE

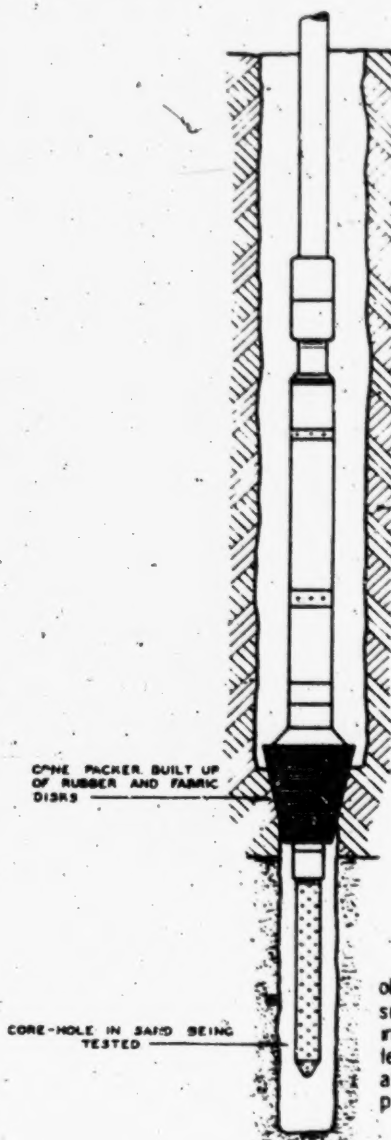
CALIFORNIA FIELDS



CASING TEST
WATER SHUT-OFF.

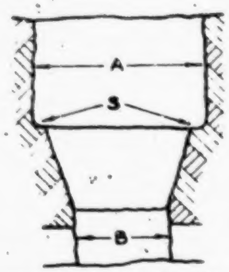


FORMATION TEST
WALL PACKER TYPE.



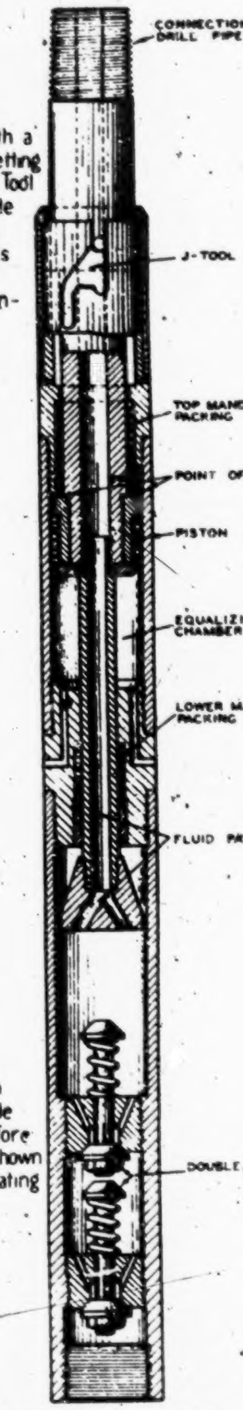
FORMATION TEST
CONE PACKER TYPE.

NOTE: HOWCO J-Type Tester opens with a strain to right and lowering drill pipe after setting packer; no complete rotation or go-devils used. Tool closes when drill pipe is picked up. Controlled rate of valve opening eliminates shock on formation or casing. Full weight of drill pipe on packer is not necessary during test. Circulation can be established whenever necessary without opening tester.



PREFERED TYPE SEAT
CONE PACKER TESTS.

NOTE: Best results on cone packer tests are obtained by making core-hole diameter B as much smaller than main hole diameter A as is possible in good drilling practice. Run off-set reamer before testing to secure good seat with shoulders as shown at S. Core-hole should be well cleaned by circulating prior to testing.



D 56 Ex.
Halliburton
Honolulu Oil
Deft
H-1

Cross

J. C. Lyon,
Testing Oil Wells,
No. 46,124, Patented Jan. 31, 1865.

Fig. 1

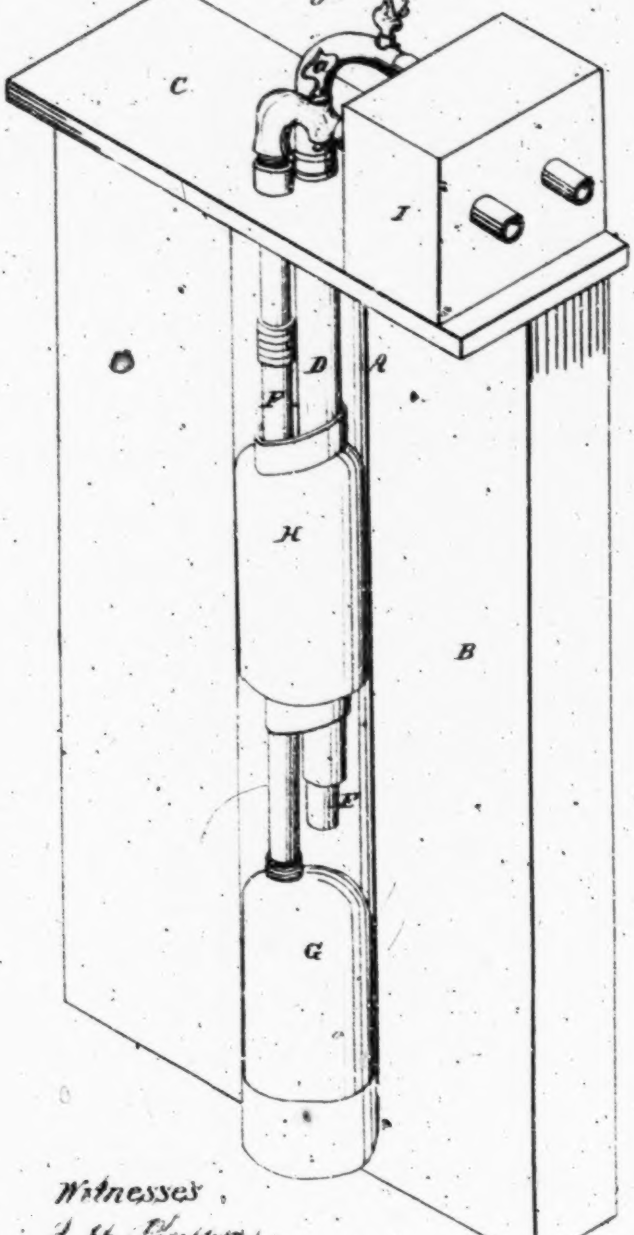


Fig. 2

Witnesses:
J. H. Phillips
Ge. C Lawrinight

Inventor;
Joseph C Lyons
By Atty J. B. Woodruff

UNITED STATES PATENT OFFICE.

JOSEPH C. LYONS, OF AUBURN, NEW YORK.

IMPROVEMENT IN TESTING OIL-WELLS.

Specification forming part of Letters Patent No. **46,124**, dated January 31, 1865.

To all whom it may concern:

Be it known that I, JOSEPH C. LYONS, of Auburn, in the county of Cayuga, in the State of New York, have invented a new and useful Apparatus for Testing Oil-Wells; and the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification.

Figure 1 represents a perspective view of the apparatus, showing the two flexible air-chambers as inflated in the bore, with the discharge and air pipes. Fig. 2 shows a detached view of a section of the discharge and air pipes, with the frame-work *g g* attached, for forcing the lower air-chamber, G, down into the well.

The object of my invention is to find where water, oil, and gas veins or fissures are, and to effect a cut-off above and below at any desired point or place in the walls of oil-wells, and to enable a change in the position of the cut off to be made at any time and at any depth below the surface, and also to convey the oil or other fluids contained between the flexible air-chambers forming the cut off, to be discharged at the surface.

My invention consists in placing within the walls of oil-wells two flexible air-chambers, the upper air chamber surrounding the air and discharge pipes, the same being so connected with the pipes that they may be forced down by them into the well to any desired point or depth, and there inflated, both at the same time, very speedily, so as to close the communication from above and below, thereby testing the different strata and ascertaining what and where the different fluids find their vent into the shaft of the well, thus enabling the water and gas courses to be effectually shut off from the oil-veins, both from above and below, causing the oil to be discharged from the surface of the wells free from other admixtures.

To enable others skilled in the art to construct and use my apparatus for testing Artesian oil wells, I will describe it and its operation more fully, referring to the drawings, and to the letters of reference marked thereon.

To illustrate the interior of the shaft or hole bored into the earth for the purpose of obtaining pure water and (more recently) oil, called "Artesian wells," I use a glass tube, A, secured in a vertical position to a plank, B, which may be so shaded as to represent the different strata and veins of fluids. In the shaft A, extending down from the top or surface of the ground C, I suspend the discharge pipe or tubing D, through which passes an air-pipe, E, extending a little below the bottom of the discharge-pipe D. The air pipe E may be dispensed with in free-flowing wells, but where the fluid to be raised is of a thick and adhesive quality, by forcing down a strong current of air, creates an ebullition and greatly facilitates bringing the substance to the surface.

On the side of the discharge-pipe D, and secured to it at intervals, I place another smaller tube or air-pipe, F, it extending down some considerable distance below the bottom of the pipes D and E, the pipe F having attached to its lower end a frame or basket, *g g*, somewhat smaller than the caliber of the well, around which frame *g* is secured a bag, G, made of strong flexible material, which, being inflated, by forcing air down the pipe F, fills out and presses hard against the sides of the shaft A, shutting off the communication below entirely while the air chamber G *g* is inflated. A short distance above the lower end of the discharge-pipe D, and entirely surrounding it and the air pipe F, is secured another flexible air-chamber, H, into which the air is forced through an orifice in the side of the tube F, so that it is inflated and fills the wall of the well above at the same time the lower chamber, G *g*, does below. This process of trying and testing the different strata, and separating the fluids which find vent in the shaft of an Artesian or oil well, can be very easily effected by my apparatus, the air pump and receiver I being placed new on one side of the top of the well, the stop-cocks *a* and *b* being connected with the receiver I so that the air tubes E and F can be easily coupled on in sections as the apparatus is being let down, so that tests can be made at every ten or twelve feet the whole length of the shaft after it is bored to any desired depth.

It will readily be seen that by my invention a sure and certain test of all of the fluids can be effected, and the location of every different ingredient accurately ascertained, and that any one of them can be separated from the others and brought to the surface at the will of the operator; and among other advantages

to be derived by inflating air-chambers to be used as cut-offs (in the place of the seed-bags which are in use) is that they can at any time be changed in their position in the shaft of the well, or taken out of one well and used in another, without any damage to the apparatus, which is not the case with the seed-bags.

Having thus described my invention, the mode of applying the same, and its operation and effect, what I claim as new and useful, and desire to secure by Letters Patent, is—

The combination and arrangement of two flexible air-chambers with the air and discharge pipes so that the air-chambers can be placed at any point within the walls of oil-wells, and there be inflated, whereby to cut off above the upper and below the lower chambers water, gas, and other substances, and thereby allow the oil to pass from a fissure between the two chambers and out of the discharge pipe, substantially as herein set forth.

JOSEPH C. LYONS.

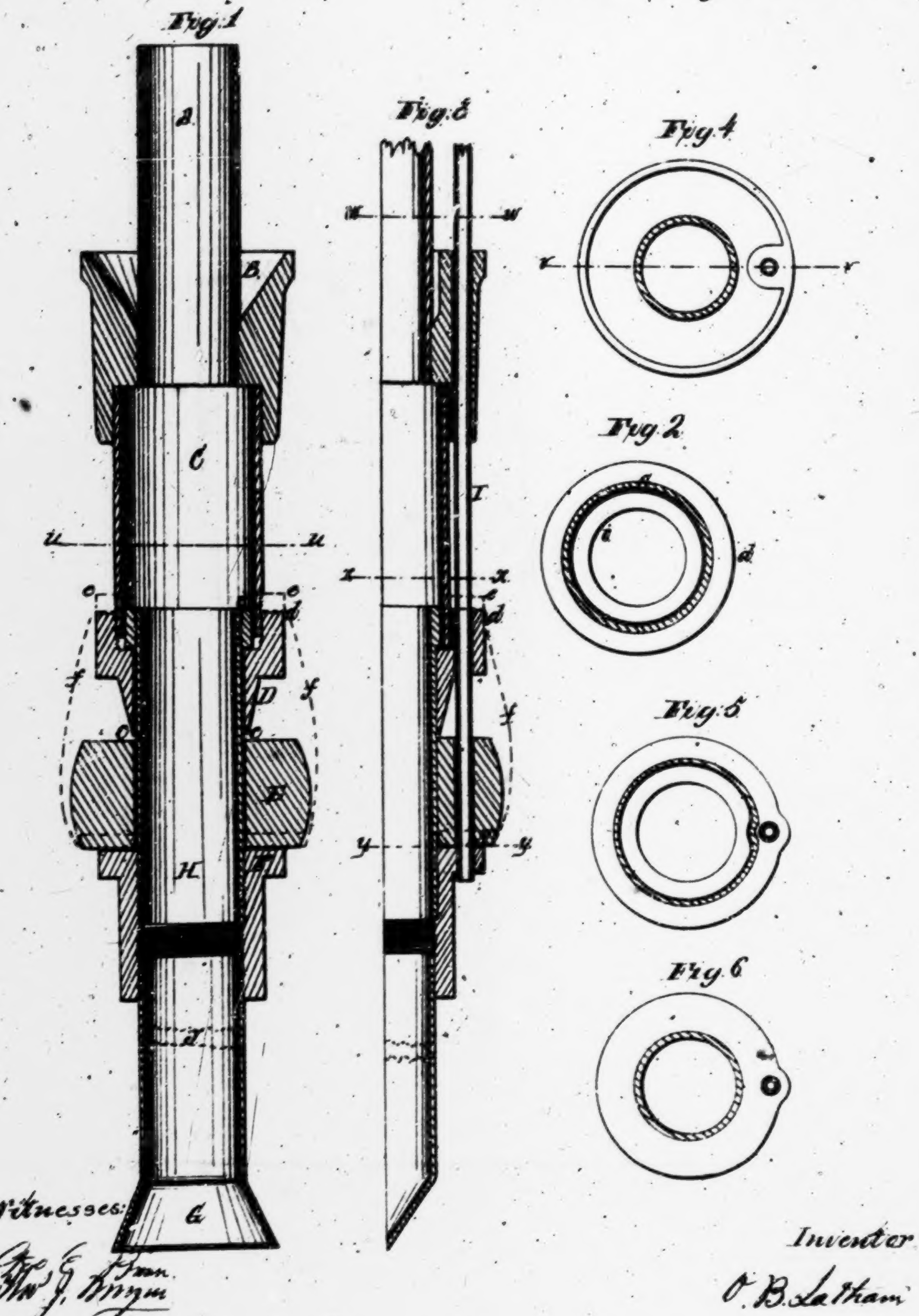
Witnesses:

J. S. BROWN,
J. B. WOODRUFF.

O. B. Latham.

Well Packing.

№ 56,234. Patented July 10, 1866.



UNITED STATES PATENT OFFICE.

OBADIAH B. LATHAM, OF SENECA FALLS, NEW YORK.

IMPROVEMENT IN OIL-WELL TUBES.

Specification forming part of Letters Patent No. 56,234, dated July 10, 1866.

To all whom it may concern:

Be it known that I, O. B. LATHAM, of Seneca Falls, county of Seneca, and State of New York, have invented a new and useful Shut-Off for Wells; and I do hereby declare that the following is a clear and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section. Fig. 2 is a transverse section through the line *u u*, Fig. 1. Fig. 3 is a vertical section through the line *v v*, Fig. 4. Fig. 4 is a transverse section through line *w w*, Fig. 3. Fig. 5 is a transverse section through line *x x*, Fig. 3; and Fig. 6 is a transverse section through line *y y*, Fig. 3.

In order that persons skilled in the art may be enabled to construct and operate my machine, I will proceed to describe it.

Like letters in different figures refer to like parts.

This invention consists in certain devices, hereinafter fully described, for the purpose of preventing water or other substance from passing below or above any required point in an oil or water well, and also for the purpose of preventing the apparatus from getting fast in the well from an accumulation of débris above it.

A is the main pump-tube, running from the top of the well down to the funnel-shaped socket B, into which it is screwed. The use of the funnel-shaped socket, which is of a diameter at its upper edge equal to that of the well less an eighth of an inch or thereabout, is to check débris in its downward progress. It is screwed upon the hollow cylinder C, which is slightly elliptical in form, for a purpose hereinafter described. Said cylinder is screwed within the flange *d* of the hollow truncated cone D, the lower edge of which is made about an eighth of an inch blunt, so as to form a shoulder for the purpose of preventing the shut-off E from sliding up on the cone while the apparatus is being lowered into the well.

i is a band of a shape corresponding to that of the cylinder C, within which it is fitted to work freely, and is securely fastened to the top of the pump-tube H. Its minor axis is equal to the diameter of the said tube, which ends in a solid chisel, G, resting upon the bottom of the well. The chisel sustains the whole apparatus, prevents any rotation of the tube H, and secures the immobility of the cylinder C by means of the elliptical shape of said cylinder and of the band *i*.

E is the "shut-off," so called, consisting of gutta-percha or other elastic or flexible material, of a diameter a little less than that of the well, so that it may be raised or lowered therein freely. When in use the shut-off is forced tightly against the circumference of the well by the pressure of the hollow truncated cone D, which is driven between the tube H and the shut-off by the weight of the main pump-tube A and of whatever débris may be upheld by the funnel-shaped socket B. As soon as the passage of water past the shut-off is stopped in this way and a vacuum created beneath, the pressure of the superincumbent water is exerted upon the shut-off, together with that of the atmosphere above the shut-off. It will be seen that by this arrangement the power exerted to expand the cut-off is always proportionate to and greater than the resistance to be overcome.

F is a flange screwed upon the tube H for the purpose of sustaining the shut-off under pressure.

Whenever it is desired to change the location of the apparatus, if the mass of débris resting upon the funnel-shaped socket B impedes the operation, it is only necessary to remove the pumping apparatus from within the tubes A and H, unscrew the tube A from the cylinder C, (which is prevented from becoming itself unscrewed during the operation by the immobility secured to it through its elliptical shape from the chisel G,) and raise the tube to a sufficient height to allow the débris to fall into the cylinder C and tube H through the funnel-shaped socket B. The tube A may then be lowered till it strikes the funnel-shaped socket, which cannot fail to guide it to its proper orifice, into which it is to be again screwed. The truncated cone D is then to be lifted up from its position between the tube H and the shut-off E, when the latter will resume its original dimensions. The whole apparatus is then to be raised to the surface, the inclosed débris emptied out, and the apparatus lowered again to any position desired.

The pump-cylinder (not shown in the draw-

ings) is situated between the chisel G and the end of the pump-tube H, and is not subject to change of position. Whenever it is desired to increase or diminish the distance between the shut-off and the chisel, lengths of pipe are to be added to or taken from the tube H. The shut-off can be located and worked to perfection at any depth.

I is a pipe sometimes made use of, running through holes drilled in the funnel-shaped socket B, flange *d*, shut-off E, and flange F, in which latter it is made fast, while the funnel-shaped socket and flange *d* work freely upon it. This pipe is intended as a means of egress for gas confined below the shut-off, or of ingress for air from above the shut-off, forced down by atmospheric or other pressure to promote the flow of oil into the pump-cylinder.

It will be seen from an inspection of Fig. 5 that when the pipe I is used a depression is made in the cylinder C to accommodate said pipe. A corresponding depression being made in the band *i*, the necessity of the cylinder and band being made elliptical is avoided.

e is a flange screwed upon the cylinder C and griping, in conjunction with the flange *d*, the upper edge of a sack, *f*, consisting of leather, bladder, or other suitable material, the lower edge of which is griped between the flanges F and *g*, screwed upon the cylinder H for the purpose. The sack *f* is made water-tight, and when in use is filled with water. It subserves the double purpose of a packing and protection to the shut-off E from the destructive action of oil, as no oil can penetrate to the shut-off from the outside, and whatever leaks into the sack from the inside floats upon the surface of the water above the shut-off. It is only to be used for this purpose when the shut-off is located at an oil-yielding stratum. It is to be used as a packing when it is desired to locate the shut-off in mud or at a point where the walls of the well are considerably irregular. It possesses peculiar advantages for this purpose. Its diameter can be increased suddenly by the pressure before spoken of, which operates it to any extent required, and it forms an immovable packing as long as the pressure continues.

When it is required to change the location of or withdraw the apparatus, it is easily and quickly elongated, and thus gotten out of the way by the upward pull. It is to be used or not, either in combination or not in combination with the shut-off, as occasion may require.

What I claim as new, and desire to secure by Letters Patent, is—

1. The cylinder C and band *i*, varying from a true circle, and arranged, in relation to the cylinder H and an external packing device, substantially as and for the purpose described.

2. The sack *f*, when used in combination with the parts H, F, G, E, D, and *d*, as and for the purpose set forth.

3. The chisel G, when used in combination with the described apparatus, for the purpose set forth.

4. The whole apparatus, arranged as described.

O. B. LATHAM.

Witnesses:

GEO. E. BROWN,

A. MOORE.

No. D 56 29

Halliburton Co.

vs.

Honolulu Oil Corp

Defts EXHIBIT

No. H-3

Filed .... 19......

R. S. ZIMMERMAN, Clerk

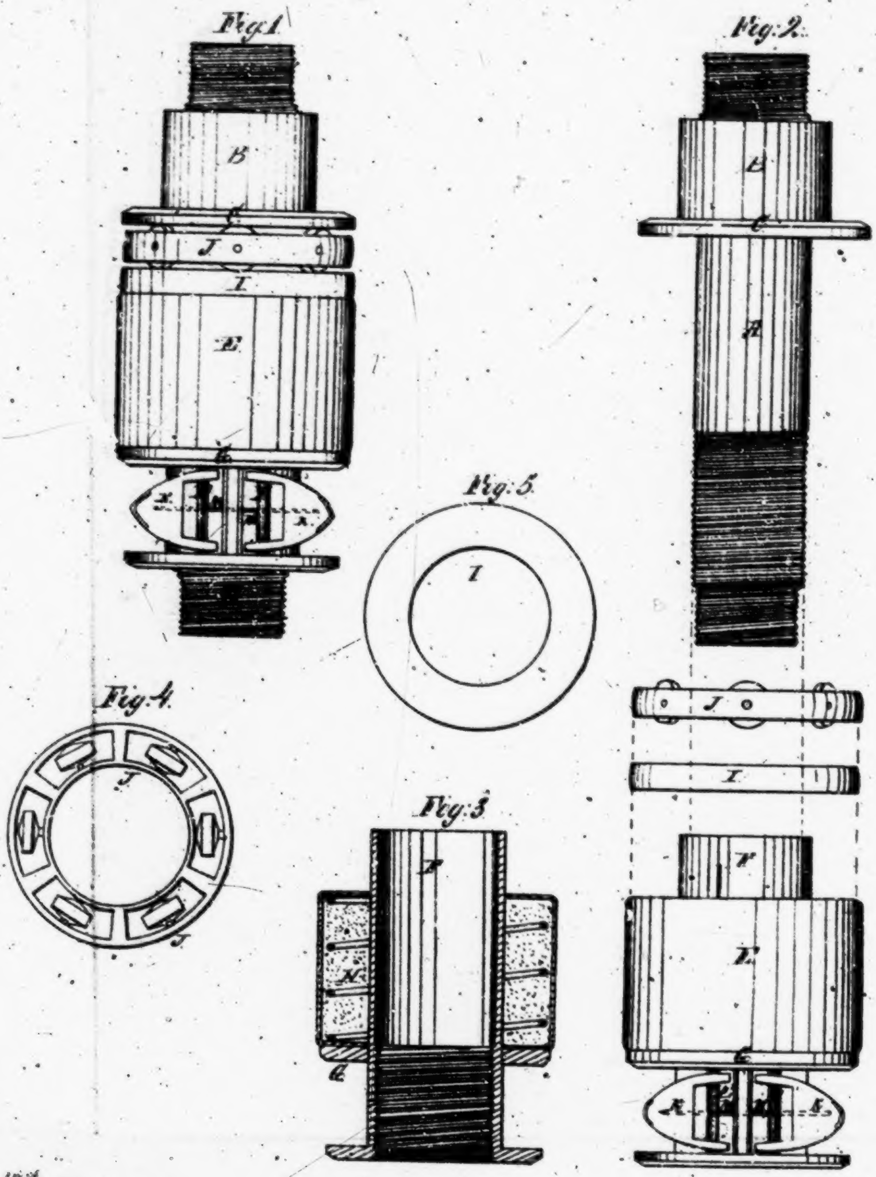
By Cross

Deputy Clerk

H. Kewley,

Pump Packing.

No. 53,837. Patented Oct. 16, 1866.



Witnesses

W. H. Benninge

J. W. McClelland

Inventor

UNITED STATES PATENT OFFICE.

HENRY KEWLEY, OF MADISON, OHIO.

IMPROVEMENT IN STOP-WATERS FOR OIL-WELL TUBING.

Specification forming part of Letters Patent No. 58,837, dated October 16, 1866.

To all whom it may concern:

Be it known that I, H. KEWLEY, of Madison, in the county of Lake and State of Ohio, have invented certain new and useful Improvements in Stop-Waters for Oil-Well Tubing; and I do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side view of the stop-water. Fig. 2 shows the relation of the several parts to each other; Fig. 3, a detached transverse section; Fig. 4, a friction-roller washer; Fig. 5, a plain flat washer.

Like letters refer to like parts in the several views presented.

A, Fig. 2, is a brass tube, to which the collar B and the flange C are attached. On the upper and lower end of the tube is cut the thread D D. It will be remarked that the two extreme ends of the tube are of the same size, but that an inch or so from the lower ends the thread is enlarged in its diameter. The purpose of these screws will hereinafter be described.

E, Figs. 1 and 2, is a strong leather sack or bag, and is fitted to the outside of the sleeve F, Figs. 2 and 3, the lower end resting upon the flange G, which is a little less in diameter than the sack. Within this sack, and coiling around the sleeve F, is the spring H. This spring plays loosely in the sack and around the sleeve.

When the spring is placed in its proper position in the sack, the sack is then filled with sand, the spring being surrounded and buried in it. The plain washer I, Fig. 5, is then slipped on over the end of the sleeve, and lies upon the upper end of the sack. This washer, corresponding relatively to the washer G at the lower end, thereby places the sack between two washers. Immediately upon the plain washer is placed the friction-roller washer J, Fig. 4.

The sack and washers, on being properly arranged, the tube A is then passed into the sleeve, the lower end of the sleeve being provided with a female screw, and the end of the tube, as above described, having two threads cut upon it, one of larger diameter than the other, the largest thread is screwed into the sleeve until the flange C comes down upon the friction-washer J. On screwing the tube into the sleeve by means of the tube-tongs, the sack is compressed so as to cause it to expand outward, the degree of expansion being as the force applied. The friction-washer being placed between the plain washer and the collar C prevents any great degree of friction resulting from the screwing of the two parts together.

A section of well-tubing, on being screwed to the lower end of the tube, which, as above described, is smaller than that screwed into the sleeve, also sections of well-tubing, on being screwed to the upper end of the tube, the water-stop is then lowered into the well, and when at the desired depth the tube is screwed into the sleeve, causing, as above stated, an outward expansion of the sack until it presses against the sides of the well, making thereby a water and gar tight joint, the oil passing up through the lower section of tubing, also through the sleeve to the tubing above, where it is free from water and to be discharged in the ordinary way.

In order to withdraw the stop-water from the well, the tube is unscrewed, releasing thereby the pressure from the ends of the sack. By the force of the spring H, above described, the sack is elongated, which releases its outward pressure against the sides of the well. It then can be lifted out in the ordinary way.

To prevent the stop-water from turning in the well while screwing the tube A into the sleeve, the lower end of the sleeve is provided with a pair of dogs, K K. These dogs are pointed with steel, and are connected to the sleeve by the pins E E, forming a joint. It will be remarked that the points of the dogs project out a little beyond the side of the collar G and the sack, and are retained in this position by the springs M M.

On screwing the tube down into the sleeve, should the sleeve turn, the dog K catches into the wall of the well, and thereby prevents the stop-water from turning in that direction, and so, on reversing the movement of the screw, the dog K catches into the wall and prevents

it from turning in the other direction. The peculiar rounded form given to the outer side of the dogs prevents them from catching in the wall on withdrawing the stop-water from the well.

What I claim as my invention, and wish to secure by Letters Patent, is—

1. The spring H, the sack E, and the tube F and the flange G, in combination with the washers I and J, in the manner and for the purpose set forth.

2. The dogs K K, the springs M M, in combination with the sleeve F, in the manner set forth.

3. The sleeve F, the sack E, and the washers J and I, in combination with the tube A, for the purpose and in the manner substantially described.

HENRY KEWLEY.

Witnesses:

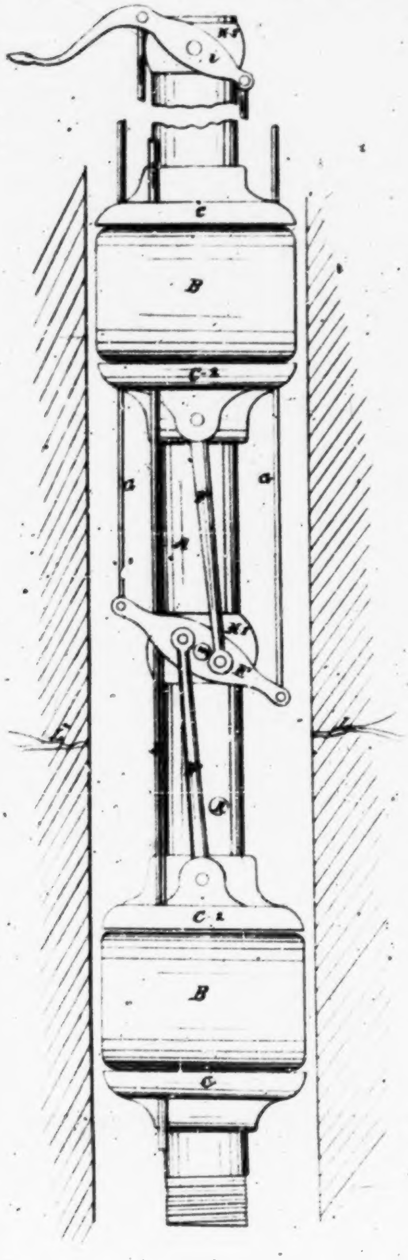
W. H. BURRIDGE,

A. W. MCCLELLAND.

Burr & Wakelee,

Oil Pump,

No. 68,350. Patented Sep. 3, 1867.



Witnesses

Geo P Burrall

[illegible]

Inventors

[illegible]

Theodore Wakelee

United States Patent Office.

THEODORE BURR AND THEODORE WAKELEE, OF BATTLE CREEK, MICHIGAN.

Letters Patent No. 68,350, dated September 3, 1867.

IMPROVEMENT IN APPARATUS FOR TESTING DEEP WELLS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, Doctor THEODORE BURR and THEODORE WAKELEE, both of the city of Battle Creek, in the county of Calhoun, and State of Michigan, have invented a new and useful Apparatus for Exploring, Testing, and Pumping in Oil and Saline Wells; and we do declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of our invention consists in providing an apparatus that will (in the first place) explore and test the properties of the well at all points from top to bottom, and enable us to ascertain the exact locality of each and every siphon or mineral vein in said well. Secondly, when the exact locality of the desired vein or siphon is found, by the mechanical operation of this invention (hereafter described) we are enabled to shut off everything foreign to the object sought for, both above and below, thereby enabling us to apply the whole force of our suction directly upon the object, whether oil or mineral-water. Third, the nature of this invention is such that it overcomes the difficulties so frequently found in oil and mineral wells, caused by the gas being confined below the seed-bag, which is now used to shut off the water above the vein; thus, by the expansive force of the gas, it overpowers the current of oil and finds its way into the siphon, carrying with it oil, water, and loose particles of earth, damming up the siphon and rendering the well useless, or otherwise it will throw out the pump and cause a trouble in that form. The gas pipe (hereinafter described) removes that difficulty, and makes it harmless.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

We use any of the metallic piping already introduced for pumping oil or mineral-water. This pipe, marked A on the drawings, is fitted at the ends so as to be attached to other joints of piping of similar dimensions; thereby it becomes a component part of the pump. Then two flanges, marked C C, are firmly secured to the pipe A, at any proper distance apart for operating purposes, with the face sides towards the centre, as seen in the drawings. Then two flanges being placed on the pipe A, and marked C–2 C–2, are fitted loose, so as to slide with ease on the pipe A, and facing from the centre, thus forming two pairs of flanges. Then two India-rubber bands, marked B B, are placed on the pipe A, between the flanges of each pair (using soft vulcanized rubber that will yield to the pressure when applied by the means hereafter described.) This forms two packing-bands to be used for the purpose of shutting off the water from above and below the siphon L L. Then a band, marked H 1, is secured firm to the pipe A, equidistant from either packing-band B B. This band H 1 is provided with a pivot, *m*, on its opposite sides, protruding out from the band H 1 sufficient to form a fulcrum and support upon which the brake E operates. The brake E is constructed in an irregular elliptical form, encircling the band H 1, and resting on the pivot *m* at its shortest central diameter. Then four extension-rods, marked F F, (two of which are not shown in the drawings,) have one end connected to the brake H 1 near the fulcrum, by pairs, the upper rods connecting with the upper flange C–2 being placed opposite each other on the flange and brake; (only one is shown on the drawings.) The lower rods F are connected to the lower flange C–2. Each rod is attached to the flanges by means of a pin, the rods F being attached to the brake E opposite the fulcrum, so that by the movement of the brake each pair of rods will move in an opposite direction, thereby causing the flanges C–2 C–2 to press tightly against the rubber bands, or otherwise loosen the pressure. Two rods, marked G G, one attached to the brake at its longest central diameter, pass up through the upper packing and connect to the lever *i* at the top of the pump. This lever encircles a band, H 2, similar to the one described below, except a handle is applied to increase the power necessary to operate the brake below. By bearing down on this handle of lever H 2 we press the rubber out so as to fill the cavity of the well at both upper and lower packing-flange, thus shutting off all above and below the packing. Then, to provide for the suction, an aperture, K, is made in the pipe A between the two packing-flanges, with the bottom end of the pipe A stopped. By this arrangement we concentrate the whole of the suction-power direct upon the siphon L. Then, to avoid the difficulty arising from gas below, we place a gas pipe on the outside of the pump pipe, which is marked D on the drawings, which passes up through both packings, thereby conveying the gas up by the siphon upon which we are operating. In order to loosen the packings we simply raise the lever *i* at the top of the well. Then,

when the siphon is at the bottom of the well one packing operated by one pair of extension-rods, at the same time closing the aperture K in the side of the pipe, and opening at the end of the pipe A.

Having thus described our invention, what we claim, is—

1. The packing-boxes B B, C C, C–2 C–2, constructed and operating substantially as described and for the purpose set forth.

2. The gas pipe D, in connection with the packing-bands, substantially as and for the purpose set forth.

3. The lever *i*, in combination with the connecting-rods G G, brake E, extension-rods F F, and packing bands B B, C C, C–2 C–2, substantially as described and for the purpose set forth.

THEODORE BURR,
THEODORE WAKELEE.

Witnesses:
GEO. P. BURRALL,
JOHN A. VAN VALKENBURGH.

John F. Carll, Sand-Pump for Oil-Wells

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PATENTED
JAN 21 1868

Fig. 1.

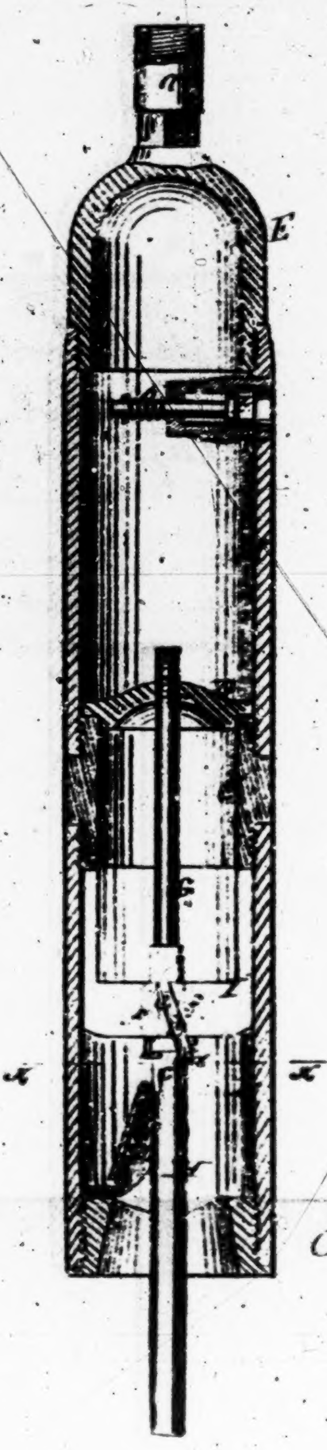


Fig: 2.

Witnesses
Theo Tusch
Wm Trewin

Inventor
Jno F. Carll
Per Munn & Co
Attorneys

United States Patent Office.

JOHN F. CARLL, OF BROOKLYN, NEW YORK.

Letters Patent No. 73,577, dated January 21, 1868.

IMPROVEMENT IN SAND-PUMPS FOR OIL-WELLS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOHN F. CARLL, of Brooklyn, in the county of Kings, and State of New York, have invented a new and improved Sand-Pump for Oil-Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to a new and improved sand-pump for oil-wells, in which the water and debris or sand in said wells is forced into the pump-cylinder through the medium of static pressure, as hereinafter fully shown and described. In the accompanying drawings—

Figure 1 represents a longitudinal central section of my invention.

Figure 2, a horizontal section of the same.

The pump-cylinder is composed of two parts, A B, connected together by a screw-coupling, C, the upper edge of which serves as a seat for a valve, D, which works in the upper part A of the cylinder, similar to a piston or plunger. E represents a cap which is screwed into the upper end of A, is perfectly tight or close at its outer or upper end, and is provided with a socket, *a*, at its apex, having an internal screw to receive a screw which joins it to the auger-stem. The cap and screw, it will be seen, serve as a connection between the pump and the auger-stem. In the upper part A of the pump-cylinder, there is placed a valve, F, opening outward, the valve-stem having a spiral spring, *b*, upon it, which has a tendency to keep the valve closed. This valve is a safety one, and is designed to prevent an undue pressure of air in A. The valve D is screwed or otherwise fitted on the upper end of a stem, G, the latter extending down into a tube, H, which passes through a pendent yoke, I, attached to the screw-coupling C. The tube H has an oblong slot, *c*, made through it, and through this slot and the valve-stem G, a pin, *d*, passes, the latter being allowed to pass through the yoke in consequence of the latter being provided with a slot, *f*, at each side of the hole, through which the tube H passes. These slots *f f* are indicated by the dotted lines in the drawing. The tube H has a pin, *g*, projecting laterally from it, which works in an oblique slot, *e*, in the yoke I. This pin *g* and the oblique slot *e* serve, when the tube H is drawn down, to turn the pin *d* so that it will be, when below the yoke I, out of line with the slots *f f*, and retain the valve D down upon its seat. In the bottom of the lower part B of the pump-cylinder there is placed a flap-valve, J, opening upward. When the pump is let down into the well, the valve D is held down upon its seat C, in consequence of the pin *d*, which passes through the stem G, being out of line with the slots *f f*. The tube H, as the pump is let down, extends below the bottom of the pump-cylinder, keeping the valve J open. The water enters the lower part B of the pump-cylinder, compressing the air therein, the valve D being kept closed by the means previously stated. When the pump nearly arrives at the bottom of the well the tube H comes in contact with the bottom, and the pump-cylinder descending, the valve-stem G is turned in consequence of the oblique slot *e* acting upon the pin *g*, and this turning of the valve-stem brings the pin *d* in line with the slots *f f* in the yoke I, and the valve D is thereby liberated, and is instantly forced upward under static pressure, the air in A above the valve D being compressed, and the water rushing into the lower end of B, carrying the debris with it. The tube H is also drawn within the lower part B of the pump-cylinder, and above valve J, which instantly closes, when H passes above it, owing to the reaction of the compressed air in A, and the pump and its contents are then drawn up. This pumping or cleaning of the well is performed at one operation, and the operation is perfect.

The invention possesses several advantages:

First. It is cheaper. Being used on the drilling-tools, it saves the expense of a sand-pump rope, friction-pulley, &c.

Second. It operates more expeditiously than an ordinary sand-pump, all "churning" being avoided, the pump-cylinder filling instantly when it touches the bottom of the well.

Third. It is safer, being less liable to stick in the hole, and if it should stick, it can be readily loosened on account of having the cable and tools to loosen it with.

Fourth. It is more effectual, for being closed at both ends, it displaces nearly all the sediment at the bottom of the well, and forces it up around the outside of the pump, and when the valve opens, this sediment is instantly

forced down under the bottom of the pump and into the same, owing to the weight of water above, the motion being so quick and the force so great, that the bottom of the well is swept clean in an instant.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent—

1. A sand-pump provided with valves D J, and their connecting agencies, arranged in such a manner that the valves will be operated automatically, and the pump filled with sand or debris under the static pressure of the water within the well or hole, substantially as herein shown and described.

2. The valve-stem G, with the tube H, yoke I, oblique slot *e*, pin *g*, and the slots *f f*, all arranged to operate in connection with the valve J, substantially as and for the purpose specified.

3. The safety-valve F, arranged in relation to the valves D J, applied to the cylinder of a sand-pump, to operate in the manner substantially as and for the purpose set forth.

JOHN F. CARLL.

Witnesses:

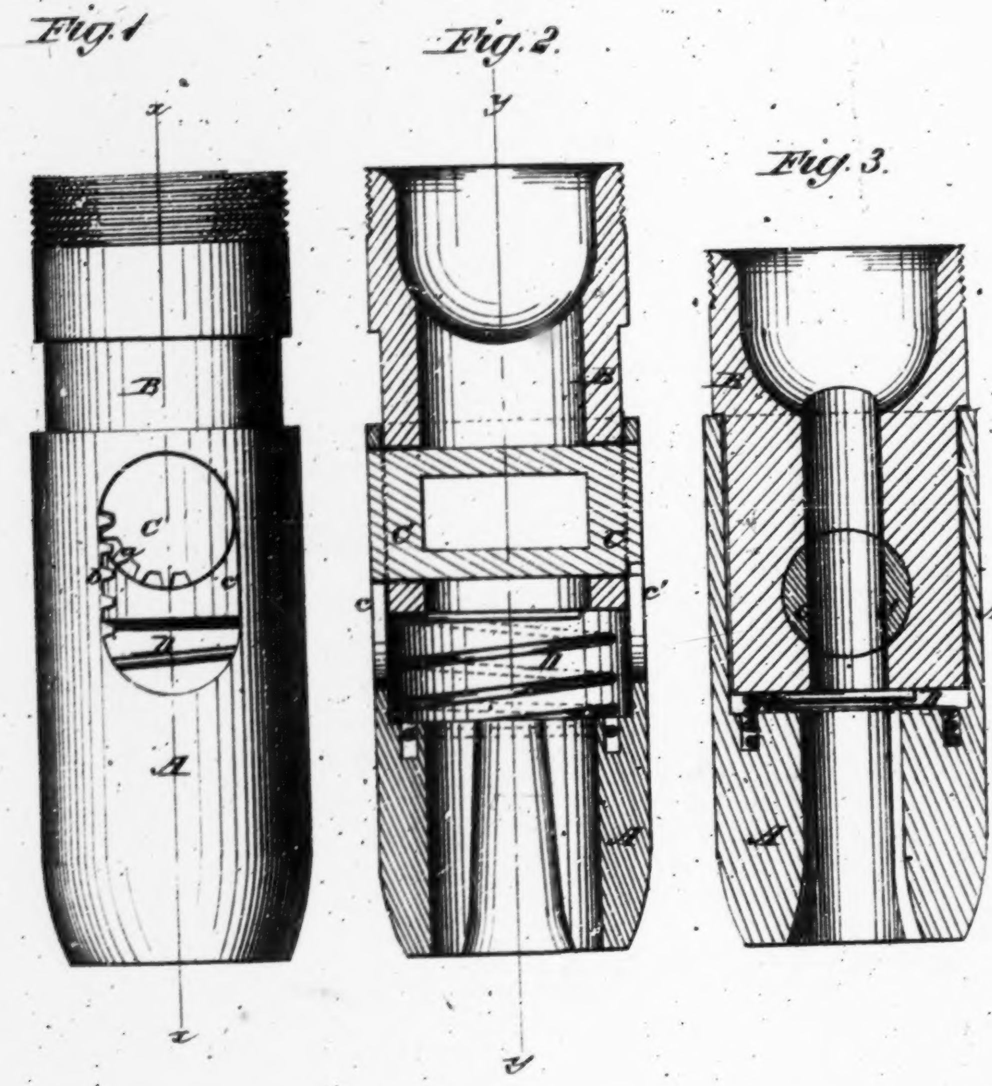
J. R. NESBITT,

A. C. GARDNER.

W. H. BIRGE.

SAND-PUMP.

No. 182,098. Patented Sept. 12, 1876.



WITNESSES:

Francis McArdle,

John Goethals

INVENTOR:

W. H. Birge

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM H. BIRGE, OF FRANKLIN, PENNSYLVANIA.

IMPROVEMENT IN SAND-PUMPS.

Specification forming part of Letters Patent No. 182,098, dated September 12, 1876; application filed August 7, 1876.

To all whom it may concern:

Be it known that I, WILLIAM H. BIRGE, of Franklin, in the county of Venango and State of Pennsylvania, have invented a new and Improved Sand-Pump for Oil-Wells, of which the following is a specification:

Figure 1 is a side elevation. Fig. 2 is a vertical section on line *x x* in Fig. 1. Fig. 3 is a vertical section on line *y y* in Fig. 2.

Similar letters of reference indicate corresponding parts.

This invention consists of an inner and outer tube, forming together the lower end of a sand-pump, arranged to slide one within the other, the inner tube being provided with a rotating valve having a segment of teeth on its outer end, which engages with a rack formed on the edge of a slot in the outer tube. A spring assists the parts to regain their normal position.

The object of the invention is to provide a valve which shall have a positive motion, not depending upon the action of the water or sand to open or close it.

A is the external tube that forms the lower end of the sand-pump, and slides easily on the tube B that is attached to the main body of the pump. C is a valve, similar in construction to an ordinary stop-cock plug, which is provided with a bearing or seat in the tube B, and projects a small distance beyond the tube B into slots *c c'* in the tube A. One end of the valve C is provided with teeth at *a* that mesh into the rack *b* formed at the edge of the slot *c'*. D is a spiral spring that rests in a groove in the tube A, and abuts against the lower end of the tube B. The tube forming the body of the sand-pump is closed at the top, excepting a small aperture, which is provided with a valve having a spring arranged to throw it open, but which is capable of closing when under water.

The pump is lowered through the sand and water with the upper and lower valve closed. When it reaches the bottom of the well the part A rests on the mud and sand, and the part B slides down into it, opening the valve, allowing the sand and water to enter the pump. The pressure thus created in the pump opens the valve at the upper end of the pump, allowing the air to escape as the sand and water enter below.

The motion of the valve is positive, and does not depend on the pressure or action of the sand and water to operate it. It is more effective in its operation, and will remove a greater quantity of sand or cuttings at one operation than pumps of ordinary construction.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A rotating sand-pump valve, which is opened and closed by the telescoping or sliding together of the parts forming the lower end of the pump, substantially as specified.

2. The combination of the sliding tubes A and B, valve-plug C, segment *a*, rack *b*, and spring D, substantially as shown and described.

WM. H. BIRGE.

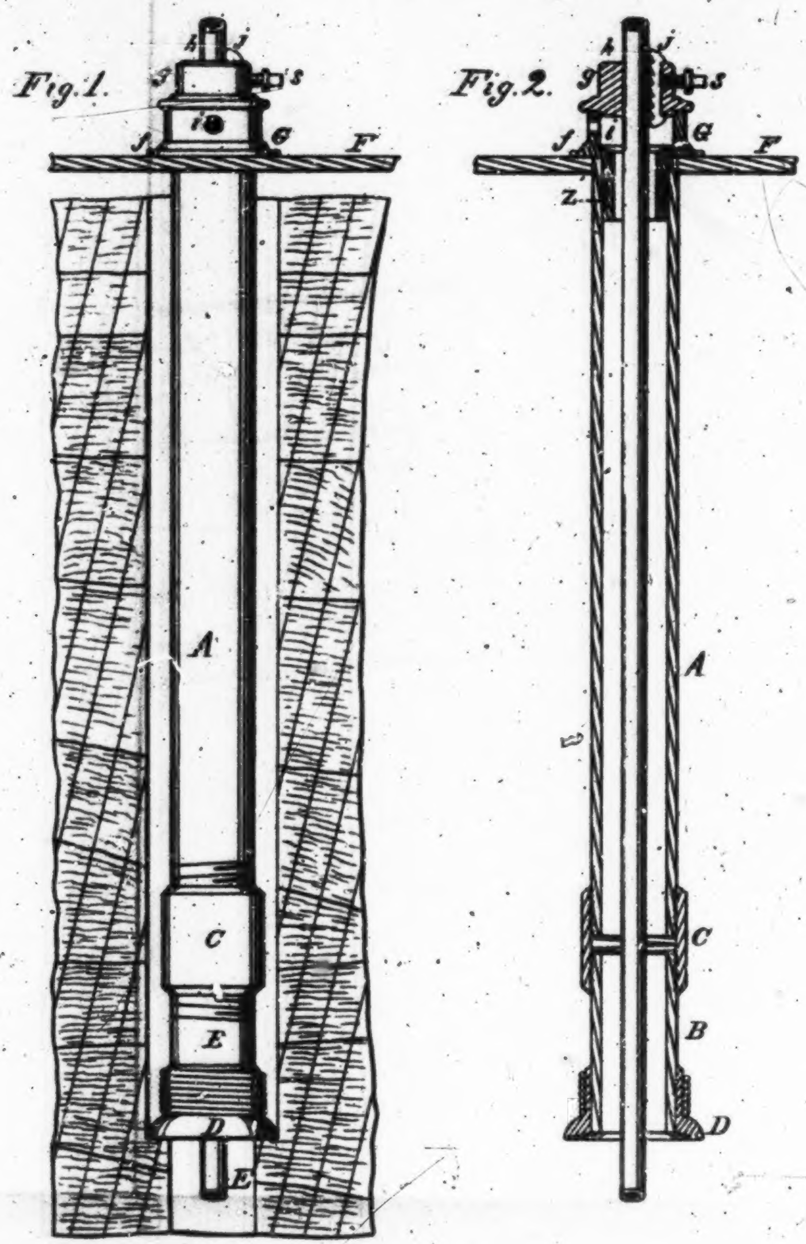
Witnesses:

GEO. ALLEN,

G. W. BIRGHAM.

G. KOCH.
Casing for Oil-Wells.

No. 208,610. Patented Oct. 1, 1878.



WITNESSES
Villette Anderson

INVENTOR
George Koch

UNITED STATES PATENT OFFICE.

GEORGE KOCH, OF ST. PETERSBURG, PENNSYLVANIA.

IMPROVEMENT IN CASINGS FOR OIL-WELLS.

Specification forming part of Letters Patent No. 208,610, dated October 1, 1878; application filed March 31, 1877.

To all whom it may concern:

Be it known that I, GEORGE KOCH, of St. Petersburg, in the county of Clarion and State of Pennsylvania, have invented a new and useful Improvement in Casings for Oil-Wells, which invention will be readily understood from the following description, taken in connection with the accompanying drawing, wherein—

Figure 1 represents a vertical section of an oil-well, showing my improved casing therein; Fig. 2, a vertical transverse section of the casing and all the parts comprising my invention.

The first part of my invention consists in such a construction and combination of a packing with the outside lower end of an oil-well casing-tube that the packing shall not only surround a certain portion of such tube, to which it is firmly affixed, but extend downward beyond its end, so as to rest upon a shoulder or offset found in the rock, and seat itself thereon in advance of the tube, by which a perfectly water-tight joint between the two is easily effected.

It also consists in the construction and novel arrangement of parts, as will be hereinafter shown and described.

In the drawing, representing an oil-well, is placed a tubular casing, A, that may be made in several sections, screwed together, and which united correspond to the depth of casing required, after the manner of those already in use. Attached to and near the bottom of this casing is a short piece of tubing, B, of the same diameter—in fact forming simply a continuation of the main line—which short piece is secured to its immediate upper tube, A, by means of a left-hand screw, that engages with a correspondingly-shaped thread cut on the inside of a union-socket, C, the upper part of which is in like manner provided with a right-hand screw, connecting it with the main tube or casing A. Surrounding the lower part of this short tube is a gum-elastic packing, D, secured thereto by a wrapping of wire or stout cord, which packing is made to extend a short distance below the extreme end of the said tube, so that when lowered in the well it will come in contact with and seat itself on the rock E somewhat in advance of the descending tube, and through its flexibility comply with the inequalities of the rock, and thereby make a perfectly water-tight joint, after which all the water may be pumped out and the operation of drilling into the rock proceeded with without further interference or delay.

For reasons not necessary to specify, the withdrawal of the casing from the well is often required, and as the casings heretofore in use make that very difficult, partly owing to their construction and partly to an accumulation of earthy matter around and above the lower end, the severance of the tube by cutting it off some distance above its lower end is often resorted to as a means of releasing the main portion of the tube, which accomplished the remaining portion is removed after the manner known to oil-well drillers.

By having the lower portion of the casing short, and united to the upper tube by means of a right-and-left-hand screw-socket, as described, the parts, if necessary, may be readily detached, the one from the other, and when the upper portion is removed the short piece B may be easily dislodged from its seat, and brought to the surface by such means as are found in practice most convenient, thus obviating the necessity of cutting or otherwise mutilating the pipe.

The top of the cylindrical casing extends up and just through the derrick-floor F, and is fitted with a circular head, G, that is made to slide some distance into the casing, and is supported thereon by means of an outside overhanging flange, *f*.

Between the casing and its head such packing *z* may be used as will prevent any escape of gas in that direction, and yet allow the head to slide upward, should the pressure be great, and it often becomes great enough to move and lift the entire casing where the head is screwed or otherwise fastened to it.

For conveying the accumulated gas to any desirable distant place, a hole, *i*, is made through the side of the head, from which pipes may be led for that purpose.

On top of the head just described is placed a tightly-fitting cap, *g*, through the center of which is lowered the pump-tube *h*, which tube may be caught, securely held, or released for proper adjustment at any desirable point by

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Having stated the nature of my invention, I claim—

1. In combination with an oil-well casing-tube, A, the gum-elastic packing D, so constructed and applied to the bottom thereof that said gum packing shall not only reach for a distance up and around the tube, but shall extend for a short distance below it, so as to seat itself upon the rock somewhat in advance of the descending tube, and thereby make a perfectly water-tight joint, substantially as and for the purposes set forth.

2. The combination, with an oil-well casing and its lower detachable section, B, having an elastic bearing, D, extending beyond its lower edge, of the right and left threaded union C, connecting the casing and its lower section, substantially as specified.

3. The detachable shouldered casing-cap g, in combination with the binding-gib j and pinch-screw s, substantially as specified.

GEORGE KOCH.

Witnesses:
JOHN LERAH,
ARON KOCH.

(Model.) 2 Sheets—Sheet 1.

J. A. DOWER.

OIL WELL PACKER.

No. 249,228. Patented Nov. 8, 1881.

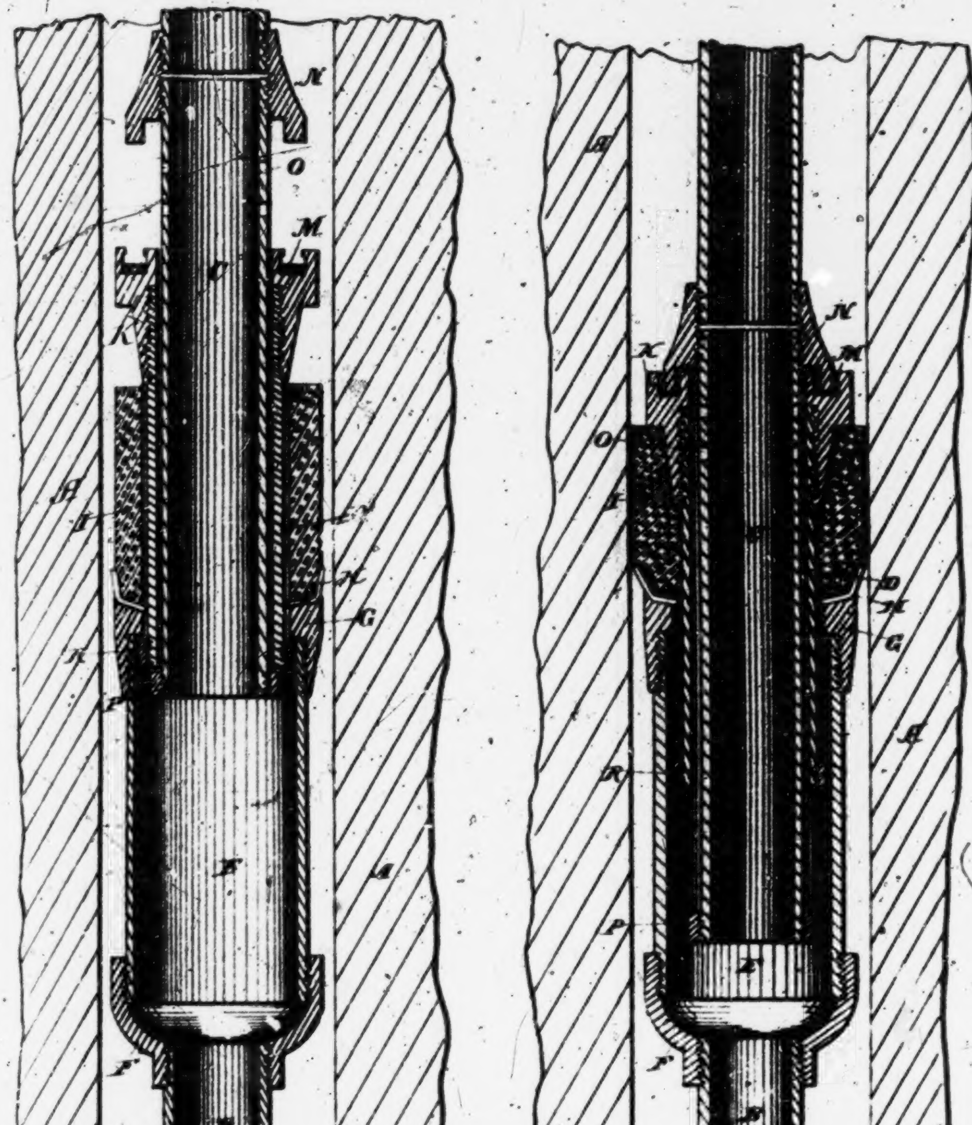


Fig. 1

Fig. 2

Witnesses
Carl Wallace
A. B. Howland

Inventor
John A. Dower
By Joseph Smith
Attorney

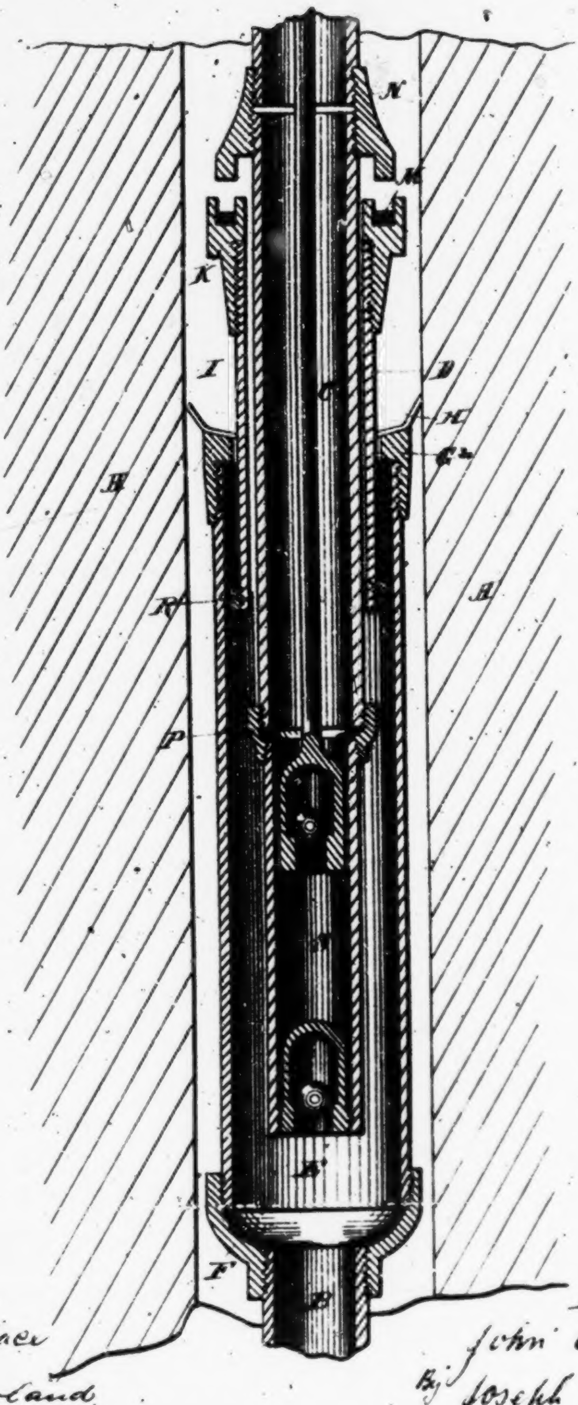
(Model.) 2 Sheets—Sheet 2

J. A. DOWER.

OIL WELL PACKER.

No. 249,228. Patented Nov. 8, 1881.

Fig 3



Witnesses
Caleb Wallace
A. B. Howland

Inventor
John A Dower
By Joseph Smith
Attorney

UNITED STATES PATENT OFFICE.

JOHN A. DOWER, OF TITUSVILLE, PENNSYLVANIA.

OIL-WELL PACKER.

SPECIFICATION forming part of Letters Patent No. 249,228, dated November 8, 1881.

Application filed March 25, 1881. (Model.)

To all whom it may concern:

Be it known that I, JOHN A. DOWER, of Titusville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Improvement in Packers for Oil or Artesian Wells, of which the following is a specification.

My invention relates to those packers in oil-wells placed around the tubing at or above the top of the sand or oil-producing rock, the object of the packer being to prevent the free escape of the gas around the outside of the tubing and utilizing it to force the oil up through the tubing, producing what is called "flowing." The tubing has a telescopic joint, and with a collar upon both the upper and lower section, the packing rim or cylinder being placed between the two collars and distended by the weight of the upper section of tubing pressing upon it, the packing-ring being supported by the lower section, which rests on the bottom of the well. As a matter of course, when the packer is in use the water and débris collect in the well above the packer and create a great pressure upon it, which has to be overcome when it is necessary to remove the tubing from the well.

The object of my invention is to enable me to relieve the packer from that pressure by admitting the fluid to the well before the packer is started from its place. This I accomplish in the manner illustrated in the drawings, in which—

Figure 1 is a section of the tubing, telescopic joints, and packer as suspended in the well before reaching the bottom; and Fig. 2 a section of the same when in place and resting on the bottom of the well. Fig. 3, Sheet 2, is a section similar to Fig. 2, but with the addition of a working barrel or pump attached to the upper section of tubing, to illustrate the method by which the well, packed for flowing, may be pumped without removing the packer.

The same letters are used in the different figures to designate the same parts.

A represents the walls of the well; B, the lower section of tubing, which rests on the bottom of the well, and which is perforated to allow the fluid to enter the tubing; C, the upper section of tubing, reaching to the mouth of the well; D, a short section of slightly greater diameter inside than the outside diameter of C, and through which C plays; E, a short and still larger section, into which D plays freely, and which is firmly connected to B by the reducer F. On the upper end of the section E is the collar G, supporting the leather cup H, which incloses the lower portion of and supports the rubber or elastic ring I, which loosely surrounds the section D. On the upper end of the section D is the collar K, which collar is made conical at the lower end, and is also recessed or grooved on its upper side to receive the elastic packing-ring M.

To the section of tubing C is secured the collar N, having its lower edge tongued and fitted to enter the groove on the upper side of the collar K and rest on the packing-ring M.

In Figs. 1 and 2 are the holes or perforations O in the tubing C, just below the collar N.

To the lower end of the sections C and D are secured the collars P and R, which respectively engage with the lower end of the section D and the collar G. This admits of the suspension of the whole contrivance from the section C of the tubing.

The operation is as follows: As the apparatus is adjusted and lowered into the well it is extended, as shown in Fig. 1. When the lower end of the section B reaches the bottom, the section C following down, the tongue on the lower side of the collar N enters the groove on the upper side of the collar K and rests on the packing-ring M, thus forming a tight joint between the sections C and D. Still pressed downward by the weight of the tubing, it forces the section D downward, forcing the cone on the lower side of the collar K inside the packing-ring I, compressing the packing, and expanding it and the leather cup H against the walls of the well, and effectually cutting off any passage of fluid up or down. When it is required to draw the tubing the section C is first raised, disengaging the collar N from the collar K, and admitting the fluid from the outside of the tubing to pass down between C and D, and also through the perforations O into the tubing, thus filling the well below the packing-ring I and relieving it from the pressure, when the whole can easily be drawn from the well.

Some wells need to be pumped occasionally, and to do this it is necessary to provide some escape for the gas, as well as to admit atmospheric pressure to the fluid. Ordinarily it has been considered necessary to remove the packer to accomplish this. I accomplish it in the man-

ner illustrated in Fig. 3, Sheet 2, which shows the same contrivance, except that a working-barrel, S, is attached to the bottom end of the section C of the tubing, and the section E is made sufficiently long to receive it. The openings O in the section C are also omitted. When arranged for pumping the tubing C is raised, disengaging the collars K and N, when the gas escapes freely between the sections C and D, and the well pumps in the ordinary manner.

As a further advantage to be gained by my construction, the vertical play of the section C inside the section D, being entirely free from contact with the elastic packing-ring I, admits of jarring, if it is necessary to do so, in releasing and removing the packer.

I make no claim for the section D telescoping with the section E, nor for the collar G, leather cup H, rubber packing-ring I, nor the cone on the lower part of the collar K, as all these have been previously patented or used.

I claim as my invention—

1. In the tubing of an Artesian well, the section D, telescoping with the section E, the section D having surrounding it the elastic packing-ring I, and with the collar K, in combination with the section C, telescoping with the section D, the collar N on the section C engaging with the collar K on the section D, the joint being packed by the elastic packing M, and with the openings O in the section C, substantially as described, and for the purposes herein set forth.

2. In the tubing of an Artesian well, the section C, telescoping with the section D, the section C having a collar, N, engaging with a collar, K, on the section D, the joint between the two collars being packed or rendered fluid-tight, in combination with any packer connected with or surrounding the section D, substantially as described, and for the purposes herein set forth.

3. As a device by which Artesian or oil wells packed for flowing can be pumped without removing the packer, the upper section, C, telescoping with the section D, which has the packing-ring surrounding it, an annular space being left between the two sections, and with the collar N upon the section C engaging with the collar K upon the section D, so that by slightly raising the section C a free passage is made for gas or fluid inside the packing-ring, substantially as described, and for the purposes herein set forth.

JOHN A. DOWER.

In presence of—

SAMUEL GRUMBINE,

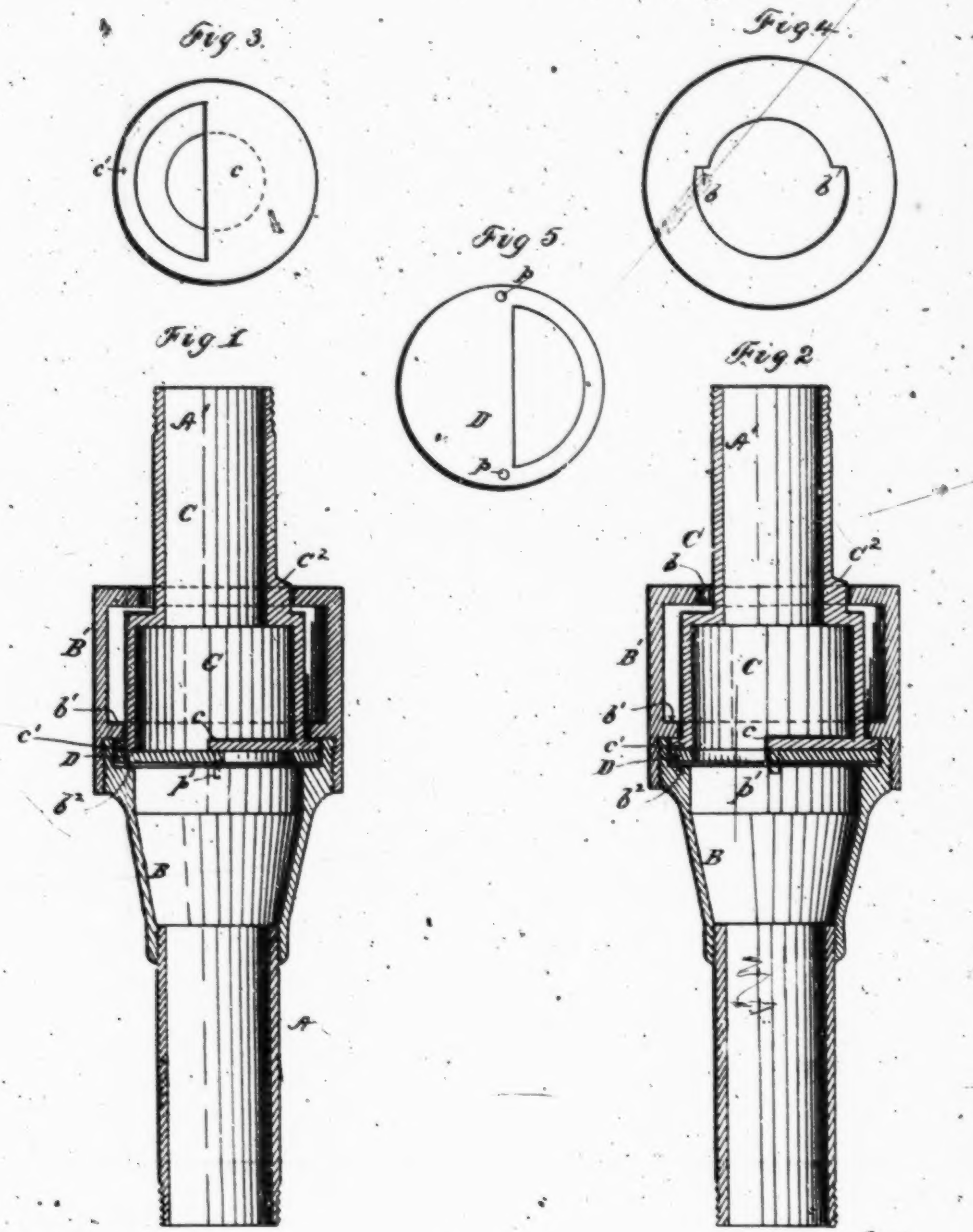
A. S. RALSTON.

(No Model.)

B. FRANKLIN.

DEVICE FOR CONTROLLING AND REGULATING THE FLOW OF OIL WELLS.

No. 263,330. Patented Aug. 29, 1882.



Witnesses

Inventor
Benjamin Franklin

UNITED STATES PATENT OFFICE.

BENJAMIN FRANKLIN, OF BRADFORD, PENNSYLVANIA.

DEVICE FOR CONTROLLING AND REGULATING THE FLOW OF OIL-WELLS.

SPECIFICATION forming part of Letters Patent No. 263,330, dated August 29, 1882.

Application filed May 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN FRANKLIN, a citizen of the United States, and a resident of Bradford, county of McKean, and State of Pennsylvania, have invented new and useful Improvements in Devices for Controlling and Regulating the Flow of Oil-Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and the letters or figures of reference marked thereon.

My invention relates to devices for regulating or controlling the flow of oil-wells; and it consists in providing a device which can be connected with the tubing of the well, either within or without the well, but preferably within at a point above the packer, which has within it a damper or valve, which can be opened or closed by turning the tubing part way around.

My device is intended to perform the offices of two different classes of devices now in use for controlling and regulating the flow of wells, as follows: When the tubing is being put into the well or withdrawn from it, it is desirable that no flow take place through it. This is effected, so far as the placing in of the tubing, by a brittle disk, which is placed in the tubing at one of the lower joints, and which closes the tubing until it is broken, which is done after the tubing is in the well by dropping down upon it a sufficient weight to break it; but this is of no service in keeping the tubing closed while drawing it, and, indeed, there is no device to my knowledge, except my own, which will close the tubing while it is being drawn. The other class of devices to which I have above referred is those for temporarily closing the tubing for the purpose of allowing the gas to obtain a head, and then opening and allowing the well to flow copiously for a short time, so as to clear it of paraffine, and also to make a well with short pressure of gas obtain sufficient head to flow. These devices are often made so as to operate automatically, and are placed down in the well, but often the result is obtained by a simple stop-cock operated manually and placed on the flow-pipe at the top of the well.

My device has to be operated manually, but it may be placed deep in the well, and thereby obtain considerable advantage. All the automatic machines for this purpose with which I am acquainted depend upon the tension of a spring or the gravity of a weight to regulate the time of their opening by the confined gas. This necessarily makes them at times defective, for the spring may fail or break, and the whole tubing must be drawn, or it may confine the gas too long by being too heavily weighted. It is impossible to gage the operation of these devices so as to be just right for all the varying circumstances and conditions incident to a flowing oil-well.

My device is free from all complications, being perfectly simple in its construction and operation.

The accompanying drawings illustrate my invention as follows:

Figure 1 is a vertical section, showing the valve closed. Fig. 2 is a like view, showing it open. Fig. 3 is a plan view of the bottom of the part C of my device. Fig. 4 is a plan view of the top of the part B′. Fig. 5 is a plan of the contained disk D.

The construction is as follows: A represents a part of the well-tubing, and A′ the point at which the upper section of well-tubing is attached.

B is a flared casting, somewhat like a reducer, which screws onto the lower section of tubing. The top of this part is rabbeted out, so as to form a shoulder, b^2. It is also provided with a screw-thread on the outside.

D is a disk with a half-circle opening in it. (See Fig. 5.) This disk lies on the shoulder b^2 of the part B. The part C, which is attached to the upper section of tubing, is also in the form somewhat of a reducer. Its lower end is half closed by a half-disk, *c*, and it is provided with a flange, c', at its lower end, and above its offset it has a lug, c^2. The lower end of the part C seats in the rabbet of the part B over the disk D. There are in the disk D pin-holes *p p*, which fit over pins p', set in the shoulder b^2, and thus the disk D is prevented from turning around, but is allowed to move vertically.

B′ is a box-cup, which screws onto the part B. It is provided with an opening for the part C and the lug c^2; but this opening is of such a form (see Fig. 4) that the lug will abut upon shoulders *b b* when the pipe is rotated, and will therefore prevent more than a half-rotation of

the pipe. The box B′ is also provided with an internal flange, b′, which ledges in over the flange of the part C and holds it in the rabbet of the part B.

In Fig. 1 the parts are in such a position that the opening in the disk D is closed by the half-cover on the part C, and hence there is no opening through the device. A half-turn of the tubing from the top of the well will bring the parts into the position shown in Fig. 2, where the two half-openings are upon each other, thus leaving a free escape for the oil.

Between the shoulder b^2 and the flange b' there is enough room to leave a very little play vertically to the parts lying between. When the tubing is in the well the upper section is often held in suspension slightly, just to keep it taut. This relieves the disk D of the weight of the tubing, and when the device is closed the pressure of gas keeps it seated on the part C above it, so there will be no leak, and the tubing can be easily turned the half-turn necessary to open or close the valve.

It will be seen that my device can be operated from the top of the well by turning the tubing, as stated above; that the oil can be shut off by it or allowed to flow at will; that the device can be kept closed while the tubing is being put into the well and then opened, and can be again closed when the tubing is to be drawn.

The disk D may be attached solid to the part B, but it is better to be loose, as shown; but whether seated loosely and held by pins or lugs, or forming an actual part of the part B, it is in fact a part of the lower half of the valve.

What I claim as new is—

1. The combination, with the eduction-tube of an oil-well, of a valve consisting of two parts adapted to abut together and turn upon each other, and provided each with an opening on one side of its center, whereby as the said parts are turned upon each other the said openings may be brought in juxtaposition or not, as desired, and thus open or close the passage in said tubing, substantially as set forth.

2. The combination, with the eduction-tube of an oil-well, of a valve consisting of the parts B, B′, C, and D, constructed and arranged together substantially as and for the purposes set forth.

3. In a shut-off valve for use on oil-well tubing, the combination, substantially as shown, of the following elements: the part B, with shoulder b^2, the disk D, with opening on one side thereof, seated on said shoulder b^2 and retained from turning by lugs or pins p', the part C, with bottom having an opening on one side seated upon said disk D, the part B′, having opening to receive the part C, with stops b b therein to abut upon the lug c^2 on said part C, and also having a flange, b', and adapted to screw upon the part B and hold the part C and disk D upon the shoulder b^2.

In testimony that I claim the foregoing I have hereunto set my hand this 27th day of March, 1882.

BENJAMIN FRANKLIN.

Witnesses:

GEO. A. STURGEON,

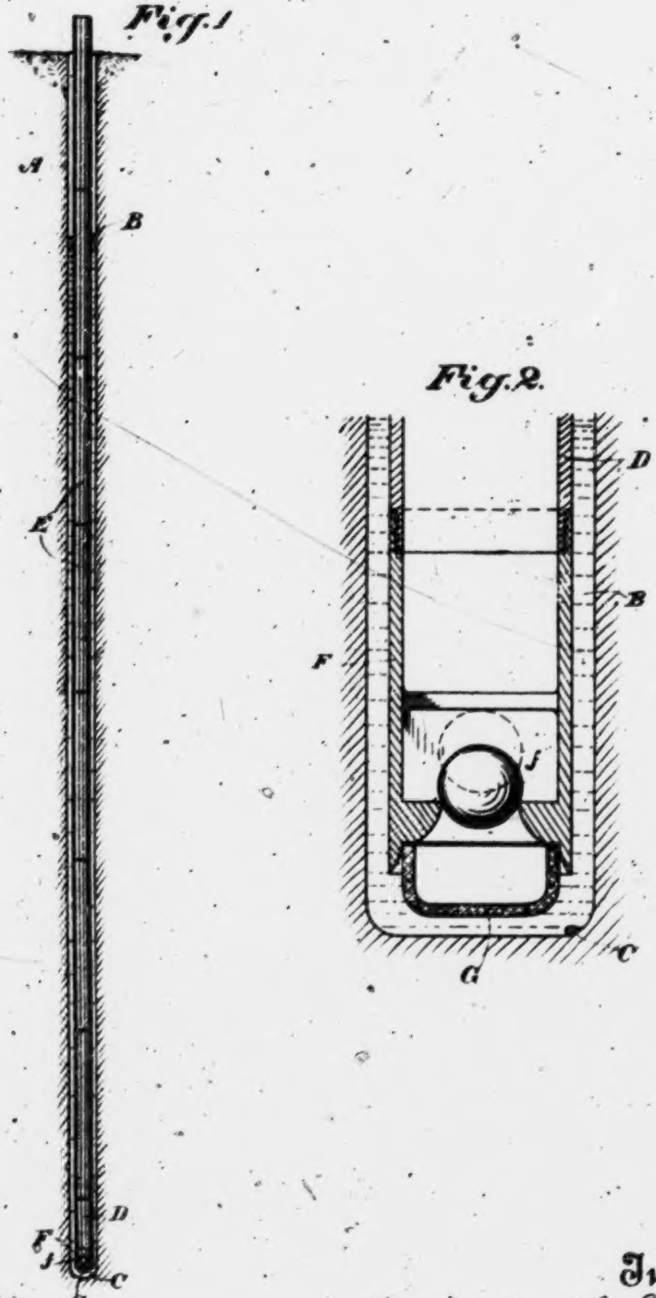
H. F. BARBOUR.

(No Model.)

W. McGREGOR.

SECURING MATERIALS AND OBJECTS FROM SUBAQUEOUS BOTTOMS.

No. 582,828. Patented May 18, 1897.



Witnesses,
[illegible]
[illegible]

Inventor
William McGregor
By Dewey & Co.
attys

UNITED STATES PATENT OFFICE.

WILLIAM McGREGOR, OF NANAIMO, CANADA.

SECURING MATERIALS AND OBJECTS FROM SUBAQUEOUS BOTTOMS.

SPECIFICATION forming part of Letters Patent No. 582,828, dated May 18, 1897.

Application filed October 29, 1896. Serial No. 610,457. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM McGREGOR, a citizen of Canada, residing at Nanaimo, British Columbia, Canada, have invented an Improvement in Securing Materials and Objects from Subaqueous Bottoms; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to means for securing materials and objects from bottoms under water.

It consists of a vessel adapted to be lowered into the water, a valve in said vessel, and a frangible cap or cover forming a closure for the lower end of the vessel and temporarily excluding the water therefrom and when broken permitting the water under its hydrostatic head to rush into the vessel and carry the materials and objects from the bottom with it into the vessel.

The object of my invention, broadly stated, is to secure materials and substances lying at a depth. These materials or substances may be samples of a subaqueous bottom, as in "sounding" or in prospecting for precious metals or stones or other natural objects, or they may be foreign to the locality and dropped or lost therein accidentally, in which case their recovery may be of great importance; but in order to better give an understanding of my invention I will state that its special object is to recover from the bottoms of prospecting holes or borings in mining operations such foreign objects as diamonds dropped from the crown-heads of diamond drills, or metallic pieces or objects broken from the boring-tools, or nails, or spikes, or other objects dropped into the hole or into an abandoned hole to which attention is again directed, or any other objects or substances which, as in the case of lost diamonds, are worth recovering, or which in any case would impede progress or injure the tools or apparatus. The removal of such objects is highly important, in that in addition to the direct loss, as in the case of a dropped diamond, their continued presence in the hole often means an abandonment of a bore which has cost a great deal of money.

In the present case I have deemed it sufficient to illustrate my invention in detail in connection with mining prospecting holes or bores from the bottoms of which foreign objects have to be removed or recovered, though it is to be understood that I do not confine my invention to this use, for, as I shall hereinafter explain, it may be used to obtain samples of any subaqueous bottom.

Referring to the accompanying drawings, Figure 1 is a vertical section of a bore or hole, showing the parts therein. Fig. 2 is the section of the lifter F.

A represents a hole or bore. In boring this hole a diamond-drill crown may be supposed to be in use. It is carried on the lower end of a core-barrel, which is itself carried on a continuous series of connected pipes called "rods." These are turned or rotated by suitable mechanism at the surface, and as the diamond-crown cuts the material the latter is forced up into the core-barrel and then the whole apparatus is drawn up and the core-barrel relieved of its contents. The apparatus is once more introduced and the operation repeated. During the operation water is pumped down through the rods to keep the parts cool, and in cases where there is a tendency to cave the water keeps the bore intact. Thus the hole or bore A has water in it, which in the drawings I have designated by B. Now let it be supposed that during the operation one of the diamonds has become loose and has dropped from the crown into the bottom of the hole. I have here designated it by C. This must be recovered. Accordingly the apparatus is lifted out of the hole and the diamond-crown is removed. In its place there is fitted to the core-barrel D, which is carried by the rods E, what may be termed a "lifter." It consists of a short cylinder F, having within it an upwardly-opening valve *f*. Then the rods, the core-barrel, and the lifter are dropped down into the hole.

In carrying out my invention I rely upon the pressure or hydrostatic head of the column of water B in the hole, and in order to make use of this I must keep the water out of the lifter, the barrel, and the rods until ready to admit it, so that its rush will carry the lost diamond up into the lifter and past the valve. It will be seen that I fit to the lower end of the lifter F a bottom G. This is water-tight

and must be made of some breakable or frangible material. Glass will be found to answer the purpose. This breakable bottom may be fitted to the lifter in any suitable manner. Now as the parts are lowered into the hole the water cannot enter the lifter nor its connected barrel and rods, and therefore the level of the water in the hole rises by displacement due to the entering tools until the water-column stands at a considerable height. When the lifter nearly reaches the bottom of the hole, the parts are dropped with sufficient suddenness to cause the bottom G of the lifter to break against the bottom of the hole. Thereupon the water B rushes in through the broken bottom G, and in its rush it carries the diamond C into the lifter and up past the valve *f* therein by which it is retained. Then the parts are lifted and the diamond is recovered. The valve *f* may be of any suitable character, such as a hinged valve or, as I have shown, a ball-valve, which is best adapted for recovering stones, while a hinged valve is for use where a piece of the core may have been left in the hole, allowing it to freely pass up into the core-barrel.

It will be seen from the foregoing that any foreign objects in the hole may thus be removed or recovered. In the case of a large object—such, for example, as the core-barrel itself—all that is necessary is to cut it up into small fragments and then remove the fragments with my apparatus.

Other cases to which this invention may be applied suggest themselves—such, for example, as prospecting gravel deposits or beds of rivers for precious metals or deep-sea dredging and sounding, in all of which uses the provision for the inrush of water at the proper time under its hydrostatic head could be provided for by simple means, such as that heretofore suggested, or others of like nature.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

An apparatus for securing materials and objects from bottoms under water, consisting of a vessel adapted to be lowered into the water, a valve in said vessel, and a frangible cap or cover forming a closure for the lower end of the vessel and temporarily excluding the water from said vessel and, when broken, permitting the water under its hydrostatic head to rush into the vessel, and carry the materials and objects from the bottom with it into the vessel.

In witness whereof I have hereunto set my hand.

WILLIAM McGREGOR.

Witnesses:

JAMES McGREGOR,

F. G. GEDDES.

No. 785,933. PATENTED MAR. 28, 1905.

O. M. BLOOM.

CASING PACKER SHOE.

APPLICATION FILED JAN. 16, 1905.

Fig. 1.

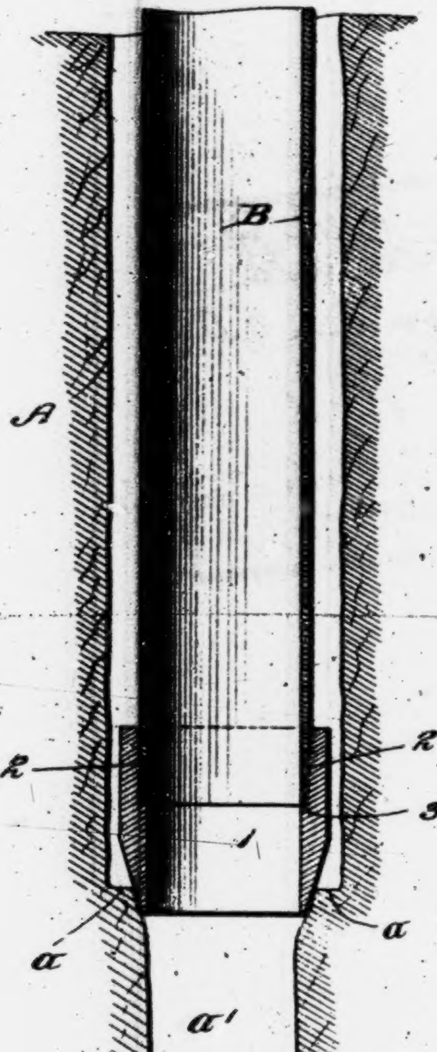
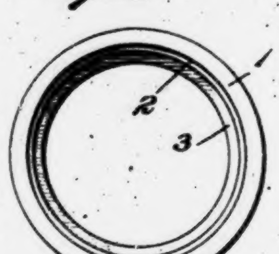


Fig. 2.

Fig. 3.



WITNESSES:

INVENTOR

No. 785,933. Patented March 28, 1905.

UNITED STATES PATENT OFFICE.

ORVIS M. BLOOM, OF INDEPENDENCE, KANSAS, ASSIGNOR OF ONE-HALF TO INDEPENDENCE IRON WORKS COMPANY, OF LIMA, OHIO, A CORPORATION OF OHIO.

CASING PACKER-SHOE.

SPECIFICATION forming part of Letters Patent No. 785,933, dated March 28, 1905.

Application filed January 16, 1905. Serial No. 241,282.

To all whom it may concern:

Be it known that I, ORVIS M. BLOOM, a citizen of the United States, residing at Independence, county of Montgomery, State of Kansas, have invented certain new and useful Improvements in Casing Packer-Shoes; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 is a vertical, central section of a section of casing, a packer-shoe embodying my invention applied thereto, and a well showing the method whereby the packing of the casing is effected. Fig. 2 is a detached sectional view of a packer-shoe embodying my invention, and Fig. 3 is a plan view of the packer-shoe shown in Fig. 2.

Like symbols refer to like parts wherever they occur.

My invention relates to that class of devices termed "packers," which are employed generally in oil or Artesian wells for the purpose of packing the tube or casing in order to shut off the water from the lower or oil-bearing section of the well.

Ordinarily in the drilling of oil or Artesian wells one or more water-veins are commonly encountered before the oil-bearing sand or the desired depth of the well is reached, and it is essential, especially in oil-wells, that the water from said veins should be shut off from the lower or oil-bearing section of the well. To effect this, the common practice is to first drill a large hole—say, one of eight and one-quarter inches, more or less, in diameter—to a point below the water-veins and to shut off the water therein by inserting a suitable casing and packing therefor, the latter located in said large hole at a point below the water-veins. Thereafter the well is continued downward at a less diameter—say, six and one-quarter inches, more or less—to the oil-bearing sand or until the desired depth has been reached. Where the diameter of the well is reduced, a shoulder is formed, which affords the usual support for the well-casing, and in some instances has been utilized to effect a packing of the casing either by the direct contact of the lower end of the casing or a shoe thereon and in some instances by the interposition between the lower end of the casing or a shoe thereon and said shoulder of an expansible or resilient and compressible packing medium—as, for instance, lead or rubber. Experience has shown that this shoulder at the point where the bore of the well is decreased is seldom perfectly flat, and as a consequence packings dependent thereon are frequently inefficient, so that as a rule expansible packings of rubber or other suitable material interposed between the casing and side walls of the well and dependent for their operation not only on the superposed weight of the casing, but on mechanical expanding devices, are most commonly employed.

The object of my invention is to avoid complex mechanical packings, such as are required for packing with the side walls, and composite packings necessary to insure an efficient packing between the shoulder and the lower end of the casing; and to this end the main feature of my invention, generally stated, resides in a packing-shoe adapted to engage with the lesser bore of the well at the mouth thereof, while a minor or secondary feature of my invention, which relates to the particular means for carrying out my invention, resides in a casing packer-shoe having the form of the frustum of a cone, the lesser diameter of which substantially corresponds to the lesser diameter of the well.

It is well known to those skilled in the art of drilling wells that the bore of the well where the diameter thereof is reduced, or, in other words, the edges of the shoulder, are more or less rounded, seldom regular or square, and liable to crumble under weight, and it is of this fact that I take advantage in applying my improved casing-packer.

I will now proceed to describe my invention more fully, so that others skilled in the art may apply the same.

In the drawings, A indicates a portion of the upper section or casing-section of a well,

a the usual shoulder therein located below the water-veins or water strata, and a' a portion of the lower section of the well or that section of reduced diameter extending downwardly to the oil-bearing sand or its equivalent.

B indicates the usual casing of any desired or required diameter, to the lower end of which is secured a packer-shoe 1, embodying my invention, the greatest diameter of said shoe being preferably from one-fourth to one-half an inch less than that of the well at the point where the packer is applied, and its least diameter being substantially that of the diameter of the lower section of the well, the upper end or mouth of which it is to enter or engage at the shoulder *a* of the well.

The form of the packer-shoe preferred by me is that of a frustum of a hollow cone recessed and threaded above, as at 2, for attachment to the casing and to form a shoulder 3 to receive the lower end of said casing and relieve the threads from the strain which might tend to strip them from the shoe and casing; but in lieu of such a connection other suitable connection between the casing and shoe may be employed, or, in fact, the shoe can be integral with the lower section of the casing without departing from the spirit of my invention, which contemplates the use of the top of the smaller hole in packing the casing in lieu of the side walls or shoulder of the well, as heretofore practiced.

The packer-shoe on the lower end of a string of casing being lowered into the well and caused to engage the bore of the lower section or lesser diameter of the well, as indicated in Fig. 1 of the drawings, will so embed itself under the weight of a string of casing as to insure an efficient packing, and the sediment, &c., which settles upon the shoulder *a* of the well and around the packer-shoe 1 will make an absolutely water-tight joint.

It is evident that the packing hereinbefore described will be equally efficient in oil or salt wells and may be applied thereto, and its use under such and similar conditions falls within the scope of the following claims.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a well-casing, of a packer-shoe adapted to engage and pack with the lesser diameter bore of an oil or Artesian well, substantially as and for the purposes specified.

2. A packer-shoe for well-casing, said shoe of tapering form and having one diameter corresponding to the lesser diameter of a well with the bore of which said packer-shoe is adapted to engage, substantially as and for the purposes specified.

3. A packer-shoe for well casing or tubing, said shoe having the form of a frustum of a hollow cone the lesser diameter of which approximates the lesser diameter of the well in which the same is adapted to be used, substantially as and for the purposes specified.

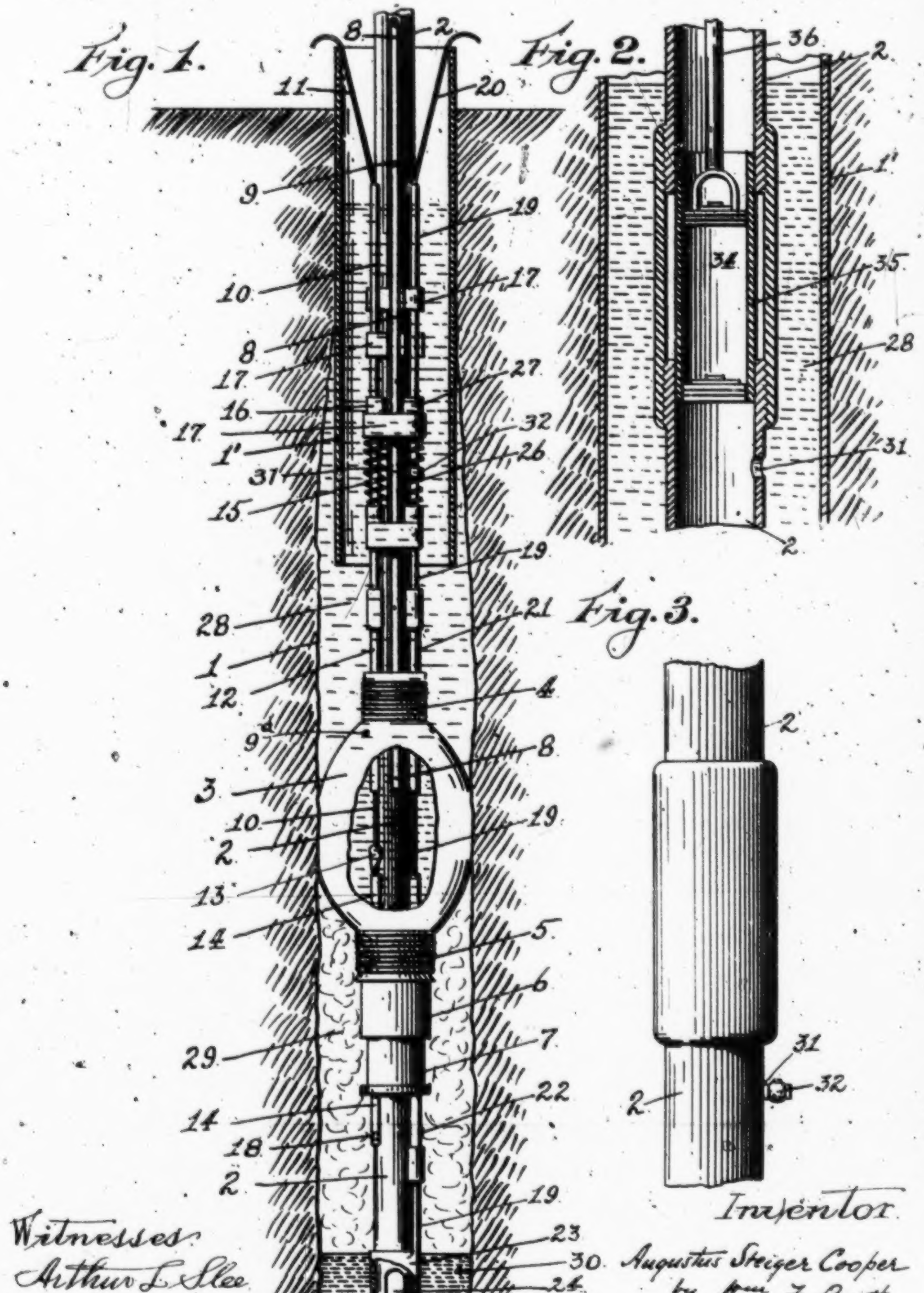
In testimony whereof I affix my signature, in presence of two witnesses, this 11th day of January, 1905.

ORVIS M. BLOOM.

Witnesses:
WM. D. O'NEILL,
J. H. MCMORROW.

A. S. COOPER.
PACKER FOR OPERATING GAS, WATER, AND OIL WELLS.
APPLICATION FILED JAN. 31, 1910.

1,000,583. **Patented Aug. 15, 1911.**



UNITED STATES PATENT OFFICE.

AUGUSTUS STEIGER COOPER, OF LOS OLIVOS, CALIFORNIA.

PACKER FOR OPERATING GAS, WATER, AND OIL WELLS.

1,000,583. Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed January 31, 1910. Serial No. 540,957.

To all whom it may concern:

Be it known that I, AUGUSTUS STEIGER COOPER, a citizen of the United States, residing at Los Olivos, in the county of Santa Barbara and State of California, have invented certain new and useful Improvements in Packers for Operating Gas, Water, and Oil Wells, of which the following is a specification.

My invention relates to the operation of gas, water and oil wells, and it consists in the novel packer and its connections, which I shall hereinafter fully describe together with its objects and manner of use, all of which will be more fully understood by reference to the accompanying drawings in which—

Figure 1 is a sectional elevation, broken away in parts, showing my invention in place in a well. Fig. 2 is a detail, showing a hole or opening in the flow-pipe, which hole communicates with the well above the packer. It also shows a pump let into the flow pipe. Fig. 3 is a detail showing the hole of Fig. 2, controlled by a check valve which may be understood according to its construction to permit the escape but not the entrance to the flow-pipe of liquids or gases, or the reverse of this function.

1 is a well, and 1′ is its casing.

2 is a string or line of pipes extending down into the well from its mouth or surface, and constitutes the flow pipe.

3 is the packer. It is a hollow dilatable and collapsible structure, and it may be made of any suitable flexible material or combination of materials, such, for example, as a textile or woven fabric or elastic rubber, or both. Its normal shape is hose-like, of greater or less diameter. The line of flow pipe 2 passes through the packer, the latter being secured at its ends to the pipe, one end, say the upper end at 4, being fixedly attached, and the other end, at 5, being slidably connected, as by being coupled to a sleeve 6 which is free to slide upon a housing tube 7 fixed on pipe 2. The reason for this connection is that the packer will the more readily expand or dilate to fill the cross-section of the well, if it be permitted to freely contract in a direction at right angles to its lines of expansion. The packer 3 may be of different designs and varying dimensions, to suit the conditions of its use.

8 is a pipe or line of pipes which extends from the surface or mouth of the well and enters and opens into the packer. This pipe is used to expand the packer, which is done by pouring water into its upper end, after the packer is located at the desired point in the well. The pressure in the packer can be regulated in several ways; for example by making holes 9 and 9^a as high above the packer as may be desired; or the pressure may be increased by carrying the pipe 8 higher than the surface or by any direct pressure means. The amount of water poured into the pipe 8 will indicate the size of the cavity filled by packer.

10 is a rod which at the upper end is connected with a rope 11, which is within reach at the mouth of the well. The rod 10 extends parallel with the flow pipe 2 and is guided by suitable collars thereon. It enters the upper end of the packer through a suitable packing gland 12, and carries a valve 13 which controls the discharge pipe 14 of the packer. The valve 13 normally closes the pipe 14 by means of a spring 15 and thus closes the packer and permits it to be expanded. By pulling on rope 11, the valve is lifted, permitting the water to escape from the packer, thus providing for the collapse of the packer, and its movement in or removal from the well. The amount of movement of the valve rod 10 is regulated by a sleeve 16 on the rod which plays between the guide collars 17 of pipe 2. The discharge pipe 14 from the packer passes out through its lower end and down through the housing tube 7 as shown. The lower end of this discharge pipe may be fitted, if necessary, with a check valve 18 which permits the water to escape from the packer but prevents the entrance thereto of gas, oil, or water from the well.

19 is a rod which at its upper end is connected with a rope 20 within reach at the mouth of the well. This rod passes down beside the flow pipe 2 in the guide collars 17, enters the packer through a packing gland 21, passes through the packer and emerges therefrom and through the housing tube 7 through a packing gland 22, and thence extends down to and operates a sleeve 23 constituting an inlet valve which controls the entrance 24 to the pipe 2, just above its end cap 25. The valve 23 is operated by pulling on the rope 20 and is shut by a spring 26 on the rod 19 above. The amount of movement is regulated by a sleeve

27 on the rod 19, which sleeve plays between the guide collars 17 of pipe 2.

28 indicates water above the packer.

29 indicates gas below the packer and 30 is the oil below the packer.

In the detail Fig. 2 I show a hole 31 in the pipe 2, in the water zone, which hole permits the entrance and escape of liquids and gases from the pipe.

In the detail Fig. 3 I show the hole 31 provided with a check-valve 32 which permits the escape from, but not the entrance to the pipe 2 of liquids or gases, or it may be so constructed as to perform the opposite function, namely to permit the entrance to, but not the escape from the pipe 2 of liquids or gases.

In the detail Fig. 2 I also indicate a pump 34 let into the flow pipe 2 between two lengths thereof. The liner 35 of this pump carries the valves, and comes away with them when the sucker rods 36 are drawn.

The device is placed and is moved and removed as follows:—The packer with its immediate connections are lowered in the well to the selected place by the rod 10, and as they are being lowered, the pipe sections forming the line or string of flow pipe 2 and the packer filling pipe 8 are screwed together. When the packer is at the required place, the string of flow pipes 2 is made to support the packer and its connections, and the strain on the rod 10 is relaxed, so that the spring 15 closes the valve 13 which thus seals the packer. Water is then poured into the string of pipes 8, until it causes the packer to expand and fit the casing or the walls of the well, thus practically separating the liquids and gases above the packer from those below it. Upon opening the valve 13, by pulling on rope 11, the packer collapses by the escape of the water therefrom and the packer can then be moved in the well or it may entirely be removed.

I will now describe the uses of the device.

There is, what I may term, continual warfare between natural gas and the liquids (oil and water) for the possession of a well. As there is relatively but a small amount of gas, and an unlimited quantity of water with a small amount of oil floating on its surface, and as the hydrostatic pressure of the water and oil does not change, while the pressure and quantity of gas is constantly decreasing, the water and oil, in the end, will be victorious. They will stifle or drown out the gas and no more can be had, and the well, if then operated for oil will be ultimately exhausted, leaving the water in possession. Wells like the above have been relieved for a time by dropping a small pipe to the bottom of the well; and the pressure of the gas while not strong enough, or in sufficient quantity to raise the column of water in a two or three inch pipe, will raise it through a three-quarters of an inch pipe, by allowing the small pipe to remain open at intervals governed by the amount of water and gas present and the pressure of the gas. The well will then continue to discharge until the amount of, and pressure of the gas decreases, until it is insufficient to operate even the three-quarters of an inch pipe.

It is a well known fact that where surface water, that is, water overlying porous or seamed strata containing oil or gas, has a greater hydrostatic pressure than the hydrostatic pressure exerted on the oil or gas in a well, the oil or gas will be driven away from the bottom of the well. Under these conditions if the packer 3 is successfully located and fixed to the walls of the well below the casing, as is shown by the accompanying drawings, the surface water 28 above the packer will be practically separated and excluded from the gas, oil and water below the packer; then, if the inlet valve 23 is opened, the gas, oil or water will rush into the empty pipe 2, and by this action relieve the pressure below the packer. If enough gas is present and is under sufficient pressure it will come out of solution from the liquids and force part of the oil or water up the pipe 2 to the surface. This action could not take place if the gas were held in solution with the liquids by a tall column of surface water or a tall column of water in the pipe 2. The size of the pipe 2 can be changed so as to accommodate it to the flow of liquid and gas. When the gas is again stifled by the water or oil, the valve 23 can be closed, and the pipe 2 bailed out and after an interval, governed by the known action of the gas and liquids in the well, the valve 23 can be again opened and the operation will be repeated. In this operation there are no sucker rods nor pump in the pipe 2, such as is shown in Fig. 2. If, after the packer is placed in the position as shown in the drawing and the valve 23 is opened, and there is not sufficient gas to force liquid through the pipe 2, the liquid can be removed from below the packer by the pump 34 shown in Fig. 2, or by bailing the pipe 2. By this method of procedure a well can be tested for the presence of oil or gas, by pumping, which could not be done if a flood of surface water were entering the well which the pump or bailer was incapable of removing.

The packer can be kept in the well while it is being operated for gas or oil.

Sometimes a string of well casing contains flaws, or is split, or a hole is worn through the casing by the rubbing of the drilling tools or rope, causing the casing to leak. If the lower end of the string of casing is closed by my packer, and a hole 31, such as I show in Fig. 2, be provided

in pipe 2, and left open, and the water is pumped from the casing above the packer by the pump 34, or bailed from the pipe 2, then if the water in the casing is not lowered by this pumping or bailing operation the casing is defective. Where the casing leaks can be located by moving the packer to different part of the casing.

The packer 3 can be employed to search for a place in the well where the surface water can be permanently shut off by cementing or otherwise. This is done by trying the packer in different parts of the well. If the packer 3 is located partly in the bottom of the casing and partly below the casing, and if the conditions are favorable the surface water can be shut off from the interior of the casing and the bottom of the well. The casing can then be freed from liquids through the hole 31 by the pump 34, or by bailing. The sucker rods 36 and the liner 35 of the pump are then drawn from the pipe 2. By doing this when the valve 23 is opened a large amount of gas would come out of solution from the liquids below the packer before the liquids had formed a column of water or oil in the casing and pipe 2 of a height sufficient to exert a pressure to stifle the flow of gas.

The casing 1′ and pipe 2 can be emptied of liquids by pumping direct from the casing. If this is done the hole 31 is fitted with a check valve 32 as in Fig. 3, which permits the escape of and not the entrance of liquids to the pipe 2.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is—

1. A device for operating gas, water and oil wells, consisting of a dilatable and collapsible packer; means operatable from the mouth of the well to effect the expansion of said packer to cause it to close the cross sectional area of the well; means operatable from the mouth of the well to effect the collapse of the packer, including a spring held valve acting automatically to close an outlet opening in the packer and an operating member extending to the mouth of the well; a flow pipe extending from the mouth of the well, through the packer and into the well below the packer; and means operatable from the mouth of the well to open and close the lower end of the flow pipe.

2. A device for operating gas, water and oil wells, consisting of a dilatable and collapsible packer; a pipe leading from the mouth of the well into said packer, through which pipe a fluid may be passed, to expand the packer and cause it to close the cross sectional area of the well; a relief pipe projecting into the packer and having openings at its opposite ends; a valve for the opening of said pipe within the packer, and connections operatable from the mouth of the well to control the valve of the relief pipe and effect the collapse of the packer; a check valve for the opening at the lower end of the relief pipe; a flow pipe extending from the mouth of the well, through the packer and into the well below the packer; and means operatable from the mouth of the well to open and close the lower end of the flow pipe.

3. A device for operating gas, water and oil wells, consisting of a dilatable and collapsible packer; a pipe leading from the mouth of the well into said packer, through which pipe a fluid may be passed, to expand the packer and cause it to close the cross sectional area of the well; a relief pipe from said packer, a valve and connections operatable from the mouth of the well to control the relief pipe and effect the collapse of the packer; a flow pipe extending from the mouth of the well, through the packer and into the well below the packer; and means operatable from the mouth of the well to open and close the lower end of the flow pipe consisting of a cup-shaped valve sleeved upon the end of the flow pipe, and suitable connections therefrom passing through the packer to the mouth of the well.

4. A device for operating gas, water and oil wells, consisting of a flow pipe; a hollow flexible dilatable and collapsible packer secured to and around said pipe at a point between its ends; the packer having a fixed connection at one of its ends and a slidable connection at its opposite end with the flow pipe; a pipe leading from the mouth of the well into said packer, for introducing a fluid thereto to effect its expansion to cause it to close the cross-sectional area of the well; a relief pipe leading from said packer; a valve in the packer to control the relief pipe and effect the collapse of the packer; operating connections from said valve passing from the packer to mouth of the well; a valve to open and close the lower end of the flow pipe, and operating connections from the valve passing through the packer to the mouth of the well.

5. A device for operating gas, water and oil wells, consisting of a dilatable and collapsible packer; means operatable from the mouth of the well to effect the expansion of said packer to cause it to close the cross-sectional area of the well; means operatable from the mouth of the well to effect the collapse of the packer; a flow pipe extending from the mouth of the well, through the packer and into the well below the packer, said flow pipe having an opening made through its wall, communicating with the well above the packer; and means operatable from the mouth of the well to open and close the lower end of the flow pipe.

6. A device for operating gas, water and oil wells, consisting of a dilatable and col-

lapsible packer; means operatable from the mouth of the well to effect the expansion of said packer to cause it to close the cross-sectional area of the well; means operatable from the mouth of the well to effect the collapse of the packer; a flow pipe extending from the mouth of the well, through the packer and into the well below the packer, said flow pipe having an opening made through its wall, communicating with the well above the packer; a check valve to control said opening; and means operatable from the mouth of the well to open and close the lower end of the flow pipe.

7. In a device for operating gas, water and oil wells, the combination with a flow pipe extending from the mouth of the well, a hollow flexible packer secured around said pipe, said packer having a fixed connection at one end with the flow pipe and a slidable connection at its opposite end therewith, and means for introducing fluid into said packer to distend the same.

8. In a device for operating gas, water and oil wells, the combination with a flow pipe extending from the mouth of the well, a hollow flexible packer secured around said pipe, said packer having a fixed connection at one end with the flow pipe and a collar at the opposite end of the packer slidably engaging over the flow pipe, and means accessible from the top of the well for controlling the admission of fluid to the packer and its discharge therefrom.

9. In a device for operating gas, water and oil wells, the combination with a flow pipe extending from the mouth of the well, a hollow flexible dilatable and collapsible packer secured to the said pipe, one of its ends being fixed and the other having a coupling member adapted to have sliding engagement with the pipe to enable it to yield in a direction at right angles to the lines of its expansion, and means accessible from the top of the well for controlling the admission of fluid to said packer, and its discharge therefrom.

10. In a device for operating gas, water, and oil wells, the combination of a casing, a flow pipe within the casing, a hollow flexible packer mounted upon the flow pipe the same having a fixed connection at one end and a movable connection at its opposite end with the flow pipe, an inlet conduit leading into the upper end of the packer and opening thereinto, an outlet conduit leading from the packer, a valve for the outlet conduit, an operating rod for the valve, a guide for said rod intermediate its ends, and a stop associated with said guide for limiting the movement for said valve.

11. In a device for operating gas, water, and oil wells, the combination of a casi a flow pipe within the casing, a hollow fle ble packer mounted upon the flow pipe t same having a fixed connection at one e and a movable connection at its oppo end with the flow pipe, an inlet conduit le ing into the upper end of the packer a opening thereinto, an outlet conduit leadi from the packer, a valve for the outlet co duit, an operating rod for the valve, a gui for said rod intermediate its ends, said fl pipe having an opening in its wall above t packer and within the casing.

12. In a device for operating gas, wa and oil wells, the combination of a casi a flow pipe within the casing, a hollow fle ble packer mounted upon the flow pipe t same having a fixed connection at one e and a movable connection at its oppos end with the flow pipe, an inlet cond leading into the upper end of the pack and opening thereinto, an outlet cond leading from the packer, a valve for t outlet conduit, an operating rod for t valve, a guide for said rod intermediate ends, said flow pipe having an opening its wall above the packer and within t casing, and a check valve for said openi

13. In a device for operating gas, wa and oil wells, the combination with a fl pipe extending from the mouth of the w a hollow flexible packer secured around s pipe, means for introducing fluid into s packer to distend the same, the packer h ing an outlet conduit, a valve for said co duit operable from the mouth of the w and a check valve also associated with s conduit.

14. In a device for operating gas, wa and oil wells, consisting of a dilatable collapsible packer; means operable from t mouth of the well to effect the expansion said packer to cause it to close the cross s tional area of the well; means opera from the mouth of the well to effect t collapse of the packer; a flow pipe extendi from the mouth of the well, through t packer and into the well below the pac said flow pipe having an opening m through its wall at a point above the pack and communicating with the well; and means operable from the mouth of the well to open and close the lower end of the flow pipe.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUSTUS STEIGER COOPER.

Witnesses:

DANIEL S. BRANT,

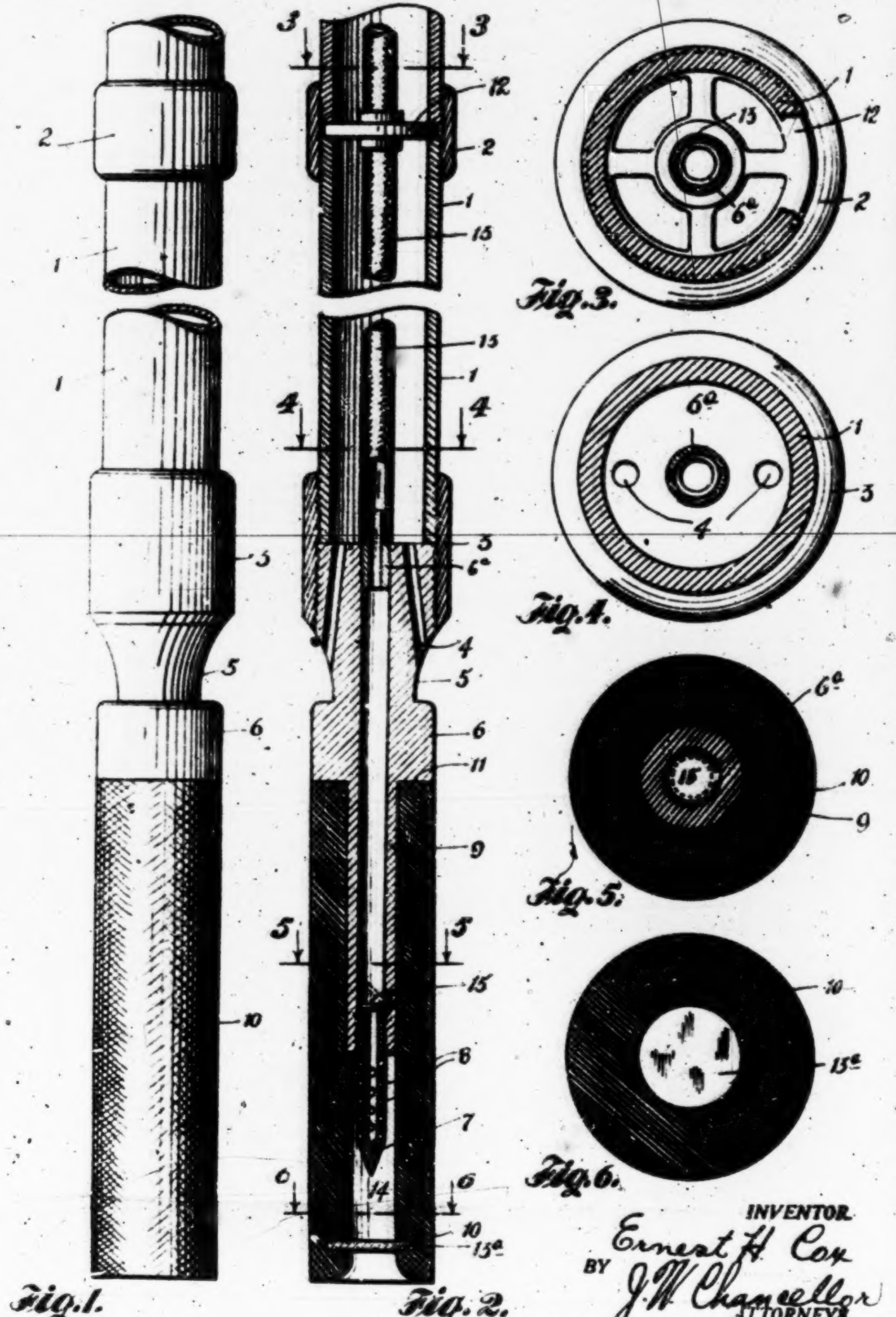
DALLAS D. DAVIS.

E. H. COX.

DEVICE FOR TESTING WELLS FOR OIL, GAS, &c.

APPLICATION FILED JUNE 24, 1920.

1,347,534. Patented July 27, 1920.



INVENTOR

Ernest H. Cox

BY J.W. Chancellor

ATTORNEYS

UNITED STATES PATENT OFFICE.

ERNEST H. COX, OF DUNCAN, OKLAHOMA, ASSIGNOR OF ONE-HALF TO J. W. CHANCELLOR, OF BOWIE, TEXAS.

DEVICE FOR TESTING WELLS FOR OIL, GAS, &c.

1,347,534. Specification of Letters Patent. Patented July 27, 1920.

Application filed June 24, 1920. Serial No. 391,302.

To all whom it may concern:

Be it known that I, ERNEST H. COX, a citizen of the United States, residing at Duncan, in the county of Stephens and State of Oklahoma, have invented certain new and useful Improvements in Devices for Testing Wells for Oil, Gas, &c., of which the following is a specification.

This invention relates to improvements in well drilling, particularly to wells drilled by the rotary system, and in such connection it relates more particularly to a device for testing wells in order to ascertain if oil, water, gas, and other liquids are under the path of the drill or in proximity thereto, that is the stratum which has not been disturbed or only partially disturbed by the drill bit; to provide means for procuring and bringing to the surface a small quantity or sampling test of such oil, sand, water or whatever is in the path of the drill bit for inspection and analysis, and to also provide an efficient and satisfactory means for complete separation of the water, mud, slush, etc., in the hole above the point from which the test is to be taken from the quantity to be investigated and analyzed, to thereby arrive at an accurate determination of the value of the drilled hole.

Such contrivances as are now in use so far as I am aware are mainly intended to ascertain the whereabouts or quality, etc., of any gas, oil, or water, which may reside in the bottom of the drilled hole and crude attempts have been made in ascertaining such information to separate the water and slush in the drill casing or hole from the liquid, gas or what not which may reside in the well, to bring it in its uncontaminated state to the surface.

My invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a vertical elevational view of the lower end of a drill stem embodying my invention.

Fig. 2 is a longitudinal sectional view thereof, and

Figs. 3, 4, 5 and 6 are cross sectional views, respectively, taken on lines 3, 4, 5 and 6, of Fig. 2.

Referring more particularly to the drawings, 1 denotes a section of a drill stem with the usual couplings 2, the drill stem shown in broken formation for better illustration.

The lower end of the drill stem 1 is threaded to receive the device for making the test. This device has a head 3 screw-threaded onto the lower end of the drill stem 1 and the head 3 is channeled or bored as at 4—4 to provide a passage for water, slush, etc., when the drill stem is lowered into the well, the channels having an oblique relationship to the drill stem as depicted in Fig. 2. The head 3 has a curved neck 5, the head 3 and neck 5 being formed integrally with the body 6. The body 6 is longitudinally channeled as illustrated at Fig. 2 and on the lower end is a sharp pointed plunger 7 for piercing the formation at the bottom of the hole. The sharp pointed plunger 7 is perforated as at 8—8 so that liquid, gas, etc., may enter. The lower portion of the device has its diameter reduced into an extended nipple-like member 9 around which is stretched or placed a rubber nose 10 and which nose abuts a shoulder 11.

Between adjacent ends of the drill stem sections 1 is interposed a ring 12 or centralizing means for a flexible metallic hose 13. The hose 13 is screwed onto the upper end of the nipple 6ᵃ. The rubber nose 10 as will be noted by reference to Fig. 2 extends beyond the lower end of the nipple-like member 9 and its opening 14 is closed preferably by a piece of glass or brittle material 13ᵃ.

In operation the drill stem carrying the device is lowered into the hole to within a short distance of the bottom where it is then dropped at sufficient speed to cause the nose 10 to forcibly strike the bottom of the hole. On such impact the sharp pointed member 7 is forced downward and on breaking the closure 13ᵃ is plunged into the bottom of the hole. The impact of the heavy drill stem will also cause the rubber nose 10 to be forced against the walls of the well and effectually shut off the water and slush in the hole from the opening 14. As the liquid enters this opening it passes through the perforations 8—8 into the hollow interior of the sharp pointed member 7 and flows upward and is held in the flexible hose 13 by a check valve 15 of any suitable construction. The drill stem may then be removed from the hole for inspection of the test.

It is obvious that on striking gas that the gas will pass upward through the member 7 and into the metallic hose 13 to the top of the well without the necessity of removing the drill stem from the well. Also that minor changes may be made in the construction of the device without departing from the principle or spirit of the invention.

Having thus described the nature and objects of my invention, what I claim as new and desire to secure by Letters Patent is—

1. In a device of the character described, a substantially cylindrical member adapted to be attached to the lower end of a drill stem, said member having a head and a neck and body, said head and neck provided with a plurality of channels traversing the head and neck in oblique relationship to the body, and opening outward and downward at the neck of the body to admit water, slush, etc., when the drill stem is lowered into the well, the lower end of the body reduced in diameter and extended into a nipple-like formation, a "packer" or nose thereon, a channel through the head and nipple-like formation, a plunger with a pointed perforated end extending from the lower end thereof, a flexible tube connected to the head and a closure over the bottom of the nose.

2. In a device of the character described, a substantially cylindrical body with a head and neck for connection to a drill stem, oblique channels traversing the head and neck, said body reduced in diameter below the neck into a relatively long nipple or shank, a channel through the shank and extending through the head and neck, a perforated plunger with a check valve, a flexible hose connected thereto, a nose or "packer" receivable on the shank, and a closure on the bottom of the "packer" or nose, all arranged so that on impact in the hole the "packer" or nose will expand against the walls of the well, the plunger will pierce or break the closure and allow the fluid or gas to pass into the plunger and flexible hose.

In testimony whereof I have signed my name to this specification.

ERNEST H. COX.

Nov. 20, 1923 1,474,630

A. L. HALLIDAY

PERFORATION CLEANER FOR OIL WELL CASINGS

Filed March 25, 1922

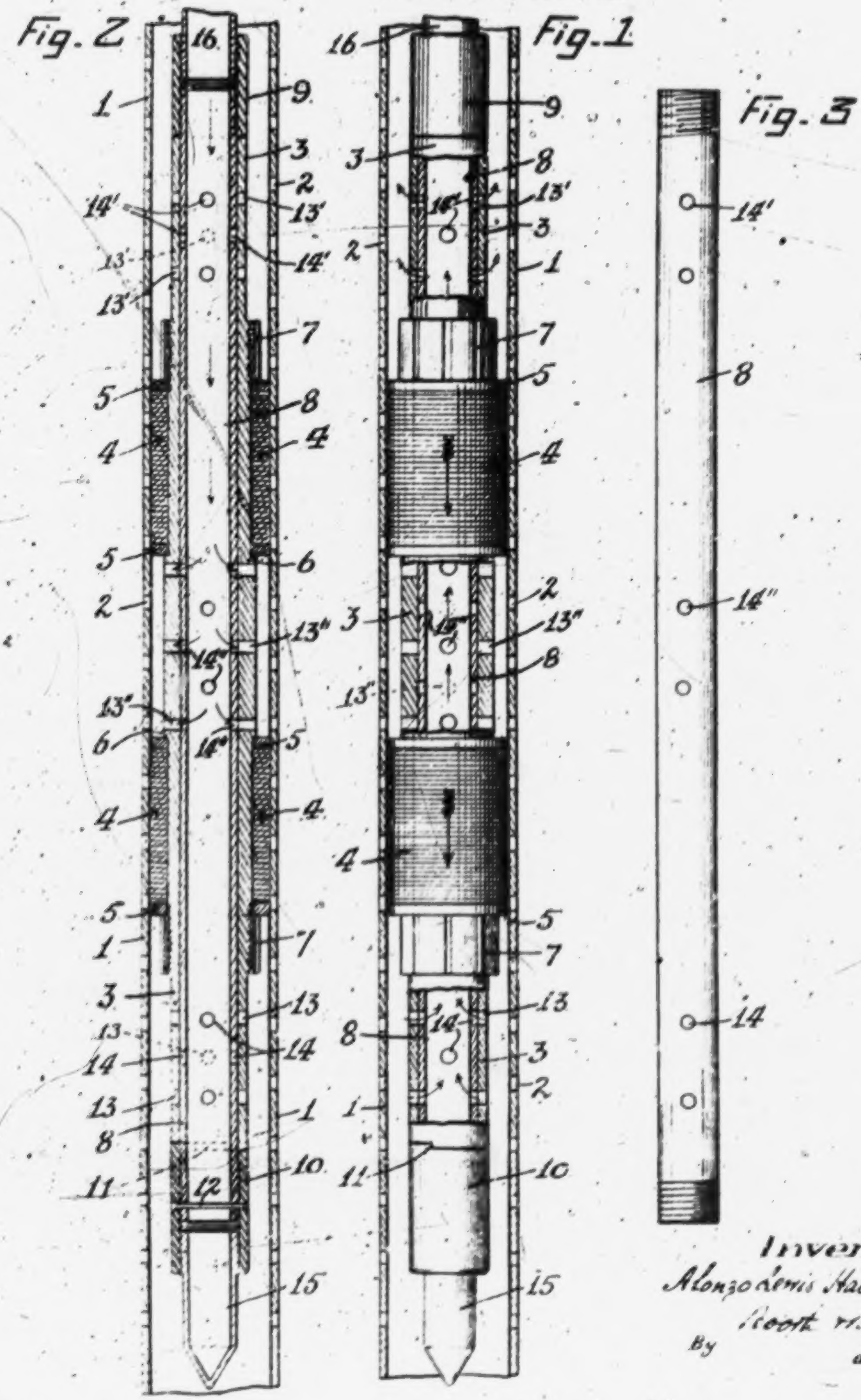


Fig. 2 Fig. 1 Fig. 3

Inventor
Alonzo Lewis Halliday
By Scott & Scott
attorneys

Patented Nov. 20, 1923. **1,474,630**

UNITED STATES PATENT OFFICE.

ALONZO LEWIS HALLIDAY, OF OIL CENTER, CALIFORNIA.

PERFORATION CLEANER FOR OIL-WELL CASINGS.

Application filed March 25, 1922. Serial No. 546,587.

To all whom it may concern:

Be it known that I, ALONZO LEWIS HALLIDAY, a citizen of the United States, residing at Oil Center, in the county of Kern and State of California, have invented certain new and useful Improvements in Perforation Cleaners for Oil-Well Casings, of which the following is a specification.

My invention relates generally to oil-well devices and appliances, and particularly to a device for cleaning out the perforations of a well-casing.

The object of my invention is to provide a simple and effective appliance for this purpose, by the use of which the clogging accumulations in the perforations may be dissolved or disintegrated, and removed by being forced out into the formation.

To this end my invention consists in the novel perforation cleaner which I shall hereinafter fully describe by reference to the accompanying drawings, in which—

Fig. 1 is an elevation, partly broken in vertical section, of my device, showing it in the well casing, the valve controls being in position to permit the cleaner to be lowered or lifted without resistance from the fluid in the well.

Fig. 2 is a vertical section of the device showing the valve controls in position for discharging the perforation-cleaning fluid introduced when the device is in operation.

Fig. 3 is an elevation of the valve-tube.

1 is the well casing, showing that portion which includes the perforated area, the numeral 2 indicating the perforations.

The cleaner appliance comprises a tubular or hollow mandrel 3, to the exterior of which are fitted two packers 4 spaced any predetermined distance apart. A simple and practical fitting of these packers consists in binding them between washers 5 and shoulders 6, by means of nuts 7 screwed upon the mandrel.

Fitted snugly in the smooth bore of the mandrel 3 is an inner tube 8, which constitutes the valve-control.

Upon the upper end of the valve tube is screwed a collar 9, and upon its lower end is screwed a collar 10, the ends of said collars abutting against the upper and lower ends of the mandrel, respectively, thereby closing the mandrel, and confining the tube within it; but said tube is adapted to be oscillated therein on its axis. A stop feature for this oscillatory axis-movement of the tube 8 is provided, which feature, in its present form, consists of the interengaging shoulders 11, formed by the arcuate cutting away of the abutting faces of the bottom of the mandrel and top of the collar 10. A pin 12, Fig. 2, is riveted through the valve tube and the collar 10 to fix the collar on the tube.

In the wall of the mandrel 3, below the lower packer are ports 13, and in the wall of the valve tube 8 are ports 14 which, by the oscillatory movement of the tube, are thrown into and out of register with the mandrel ports.

Similarly, in the mandrel and valve-tube, above the upper packer are ports 13′ and 14′, respectively, corresponding in position to the lower ports 13 and 14, so that both sets of ports are moved into and out of register simultaneously, by the turning of the valve-tube. In the walls of the mandrel and the valve-tube, in the area between the two packers 4, are ports 13″ and 14″ respectively. These last named ports are, however, placed relatively to the first named ports, in such wise that when the upper and lower sets of ports are opened the intermediate set is closed and vice-versa; and at an intermediate position all three sets are closed.

The lower end of the valve-tube 8 is closed by a plug 15 screwed to the lower collar 10, said plug serving also as a rest in case the device is lowered to the bottom of the well.

To the upper collar 9 is connected the tubing string 16.

In using the cleaner, the tubing string 16 is connected at the derrick to a discharge line from a force pump, by a swivel connection, the tubing being suspended by means of elevators hooked onto the regular tubing-pulling equipment, but as these parts are not necessary for an understanding of my present invention, I have not herein shown them.

My device being, as above stated, connected to the bottom of the tubing string, is lowered into the well to the desired depth. Due to the fact that the tight fit of the packers 4 in the casing 1, prevents the mandrel 3 from turning, the valve tube 8 may be turned in the mandrel (by turning the tubing string at the derrick) until it is arrested by the stop 11, and in this position the lower set of ports 13 and 14 and the upper set of

ports 13′ and 14′ are in respective register, as shown in Fig. 1, so that the fluid in the well may pass in through the ports 13 and 14 and up in the inner tube 8, and out through the ports 13′ and 14′ as indicated by the arrows. By such relief passage for the fluid in the well, the device may be lowered easily; otherwise, the packers 4 would act as pistons and would have to be forced down against pressure. When the device has been lowered to the desired depth, the valve tube is turned back again to its stop, thereby closing the ports 13, 14, 13′ and 14′ and opening the intermediate ports 13″ and 14″, in the area between the two packers, as shown in Fig. 2. Then fluid is pumped down through the tubing string 16 and this fluid, discharging through the ports 13″ and 14″ of the cleaner, clears the perforations 2 in the casing 1, in the zone or region lying between the two packers, said fluid being prevented from discharging otherwise, because the valve tube 8 is closed except at the ports 13″ and 14″.

The volume and pressure of the fluid pumped out through the relatively restricted space between the packers is effective to remove or dissolve the clogging accumulations from the casing perforations 2 and from the outer wall of the casing.

By vertically moving the cleaner at intervals, a distance determined by the length of the space between the packers, and applying fluid pressure, as mentioned, the entire section of well-casing perforations may be cleaned.

A further advantageous feature in the operation of the cleaner is that by turning the inner tube only partially all the port sets may be closed. The fact that they are closed may be indicated by a pressure gage on the force pump line at the derrick. After this pressure has reached a desired height, the inner tube may be turned farther to open the ports 13″ and 14″; and by thus suddenly releasing this high pressure, it will serve more effectively to remove the clogged formation from the casing perforations.

Upon removing the device from the well, the upper and lower sets of ports are again opened to permit the fluid above the top packer and that which stands in the tubing string to flow back into the well, and thus prevent the pulling of a wet string. Any fluid such as oil, distillate or water may be used in the operation of the device, to suit the particular difficulty encountered. Clean crude oil of low gravity and slightly warm will be found effective, as it acts to suspend in solution the formation with which it comes in contact, and so allows it to flow back into the well, to be pumped out.

Another point of advantage lies in the fact that by the use of this device any imperforate spaces of the well casing, which sometimes happen, by reason of a defective perforating machine, may be located, as such spaces will show on the pressure gage.

I claim:—

1. A perforation cleaner for well-casing comprising a hollow mandrel having ports in its side; a pair of spaced packers carried by the mandrel one on each side of its ports and adapted for contact with the interior of the well casing to close an annular space between the mandrel and casing; and a valve member seated within said mandrel for controlling its ports.

2. A perforation cleaner for well-casing, comprising a hollow mandrel having ports in its side; a pair of spaced packers carried by the mandrel one on each side of its ports and adapted for contact with the interior of the well casing to close an annular space between the mandrel and casing; an axially oscillatory hollow valve member fitted within and closing the mandrel, said valve member having ports in its side adapted to move into and out of register with the ports in the mandrel; and a tubing string connected with and adapted to pass fluid under pressure into the valve member.

3. A perforation cleaner for well-casing comprising a hollow mandrel having upper, lower and intermediate ports in its side; a pair of spaced packers carried by the mandrel one between the upper and intermediate ports and one between the lower and intermediate ports, said packers being adapted for contact with the interior of the casing to close an annular space between the mandrel and casing; an axially oscillatory hollow valve-member fitted within and closing the mandrel, said valve member having upper, lower and intermediate ports in its side adapted to move into and out of register with the corresponding ports of the mandrel, the upper and lower ports of the mandrel and valve member relatively corresponding, whereby their control is simultaneous, and the intermediate ports being angularly offset relatively to and their control alternative with said upper and lower ports; and a tubing string connected with and adapted to pass fluid under pressure into the valve member.

4. A perforation cleaner for well-casing comprising a hollow mandrel having upper, lower and intermediate ports in its side; a pair of spaced packers carried by the mandrel one between the upper and intermediate ports and one between the lower and intermediate ports, said packers being adapted for contact with the interior of the casing to close an annular space between the mandrel and casing; an axially oscillatory hollow valve-member fitted within and closing the mandrel, said valve member having upper, lower and intermediate ports in its side adapted to move into and out of regis-

ter with the corresponding ports of the mandrel, the upper and lower ports of the mandrel and valve member relatively corresponding whereby their control is simultaneous, and the intermediate ports being angularly offset relatively to and their control alternative with said upper and lower ports; a stop for defining the limits of oscillation of the valve member; and a tubing string connected with and adapted to pass fluid under pressure into the valve member.

5. A perforation cleaner for well casing comprising a member to be suspended within the casing and adapted for discharging a fluid under pressure against the perforated section thereof; means seated within said member for controlling the discharge therefrom and means for closing the space in the casing around said member in the zone of its discharge.

6. A perforation cleaner for well casing comprising a member to be suspended within the casing and adapted for discharging a fluid under pressure against the perforated section thereof; an axially oscillatory valve seated within said member for controlling the discharge therefrom; and means for closing the space in the casing around said member in the zone of its discharge.

In testimony whereof I have signed my name to this specification.

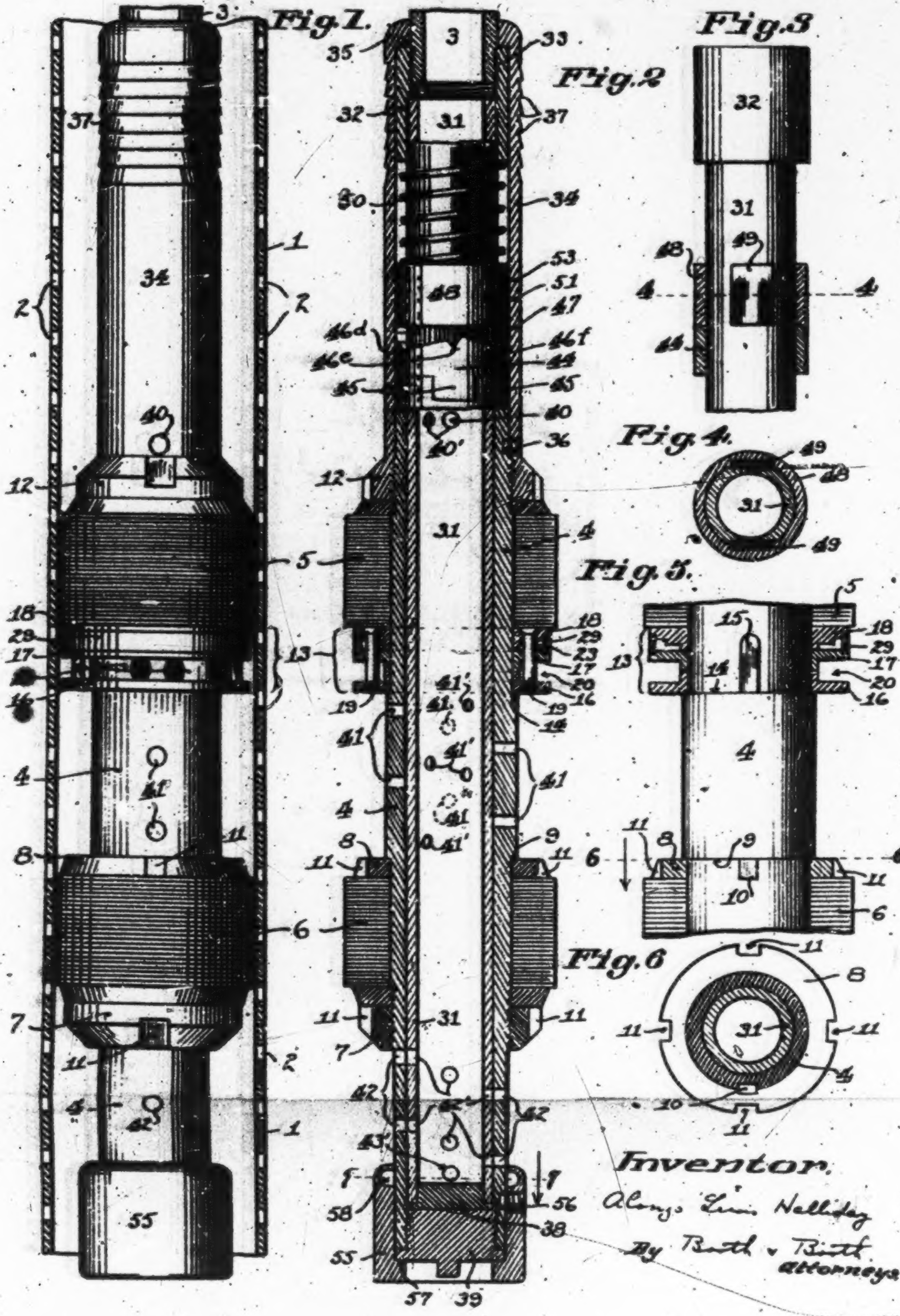
ALONZO LEWIS HALLIDAY.

Oct. 7, 1924. 1,510,669

A. L. HALLIDAY

PERFORATION CLEANER FOR OIL WELL CASINGS

Filed April 3, 1923 3 Sheets-Sheet 1



Oct. 7, 1924. 1,510,669

A. L. HALLIDAY

PERFORATION CLEANER FOR OIL WELL CASINGS

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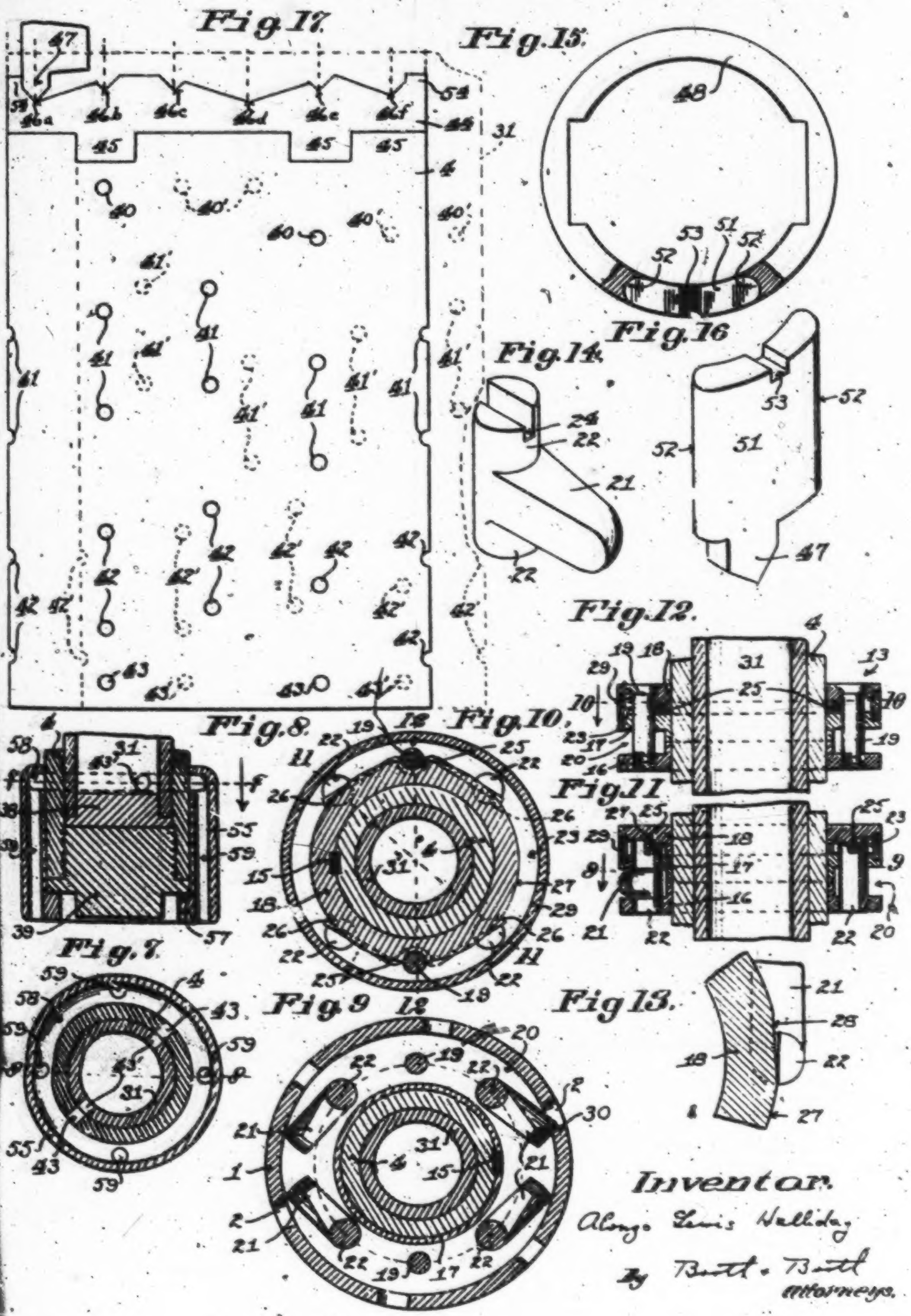


Oct. 7, 1924. 1,510,669

A. L. HALLIDAY

PERFORATION CLEANER FOR OIL WELL CASINGS

Filed April 3, 1923 3 Sheets-Sheet 3

Fig.18.

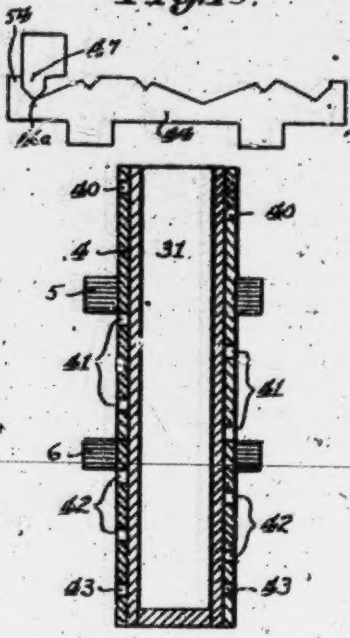


Fig.19

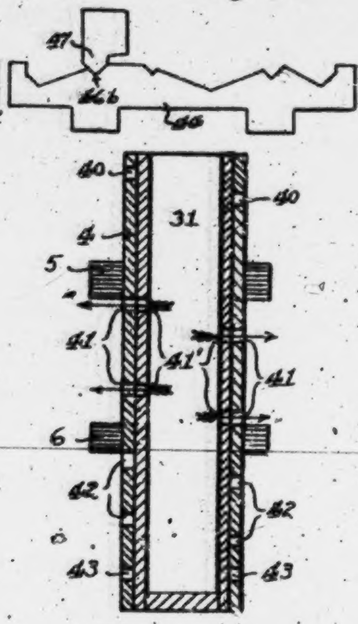


Fig.20

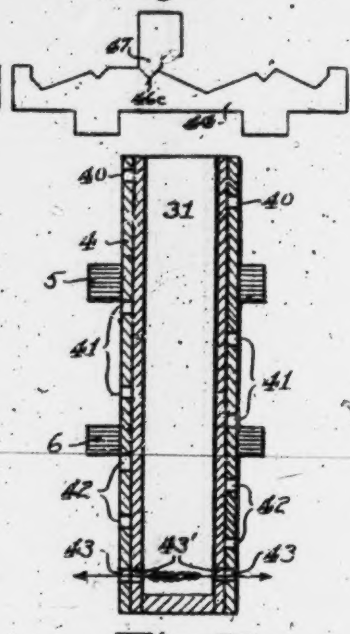


Fig.21

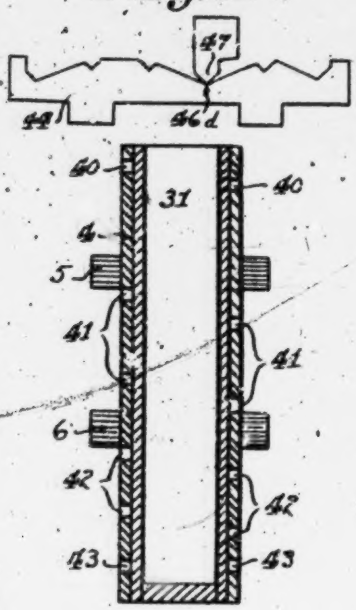


Fig.22

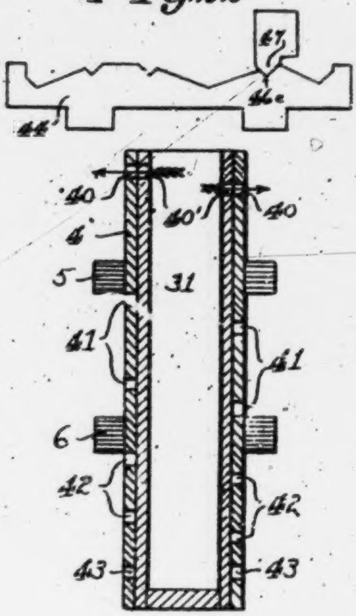
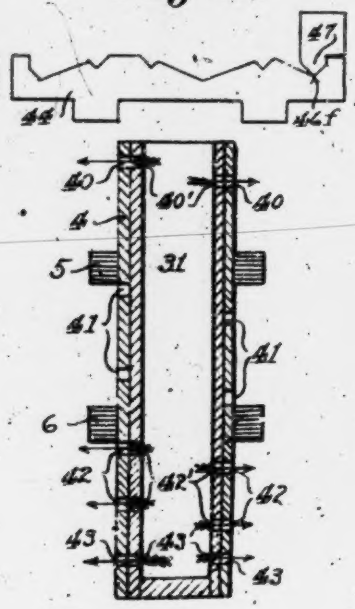


Fig.23.



Inventor.

Alonzo Lewis Halliday

By Barth & Barth, Attorneys.

Patented Oct. 7, 1924. 1,510,669

UNITED STATES PATENT OFFICE.

ALONZO LEWIS HALLIDAY, OF OIL CENTER, CALIFORNIA.

PERFORATION CLEANER FOR OIL-WELL CASINGS.

Application filed April 3, 1923. Serial No. 629,631.

To all whom it may concern:

Be it known that I, ALONZO LEWIS HALLIDAY, a citizen of the United States, residing at Oil Center, in the county of Kern and State of California, have invented certain new and useful Improvements in Perforation Cleaners for Oil-Well Casings, of which the following is a specification.

My invention relates generally to devices for cleaning oil-well casings in the region of their perforated sections and dislodging and disintegrating caked formation which lies around and in close proximity to the exterior surface of the casing.

My invention relates particularly to and consists in certain novel improvements in the perforation cleaner disclosed in my United States Letters Patent No. 1,474,630, issued Nov. 20, 1923, upon my application Serial No. 546,587, filed March 25, 1922, which said disclosure will necessarily be repeated herein to an extent required for a full understanding of said improvements.

These improvements concern the arrangement and selective control of the ports through which the cleaning fluid is discharged, the stop feature by which the several positions of the selective control valve member are defined, a means for better holding the tool against possible rotation in the casing while operating said valve member, and changes in the construction of the several parts of the device which make for greater strength and ease of operation and longer life, all of which will be more fully described hereinafter with the understanding that changes may be made in the form and construction of the device as herein described and illustrated, without departing from the spirit of the invention as expressed in the claims hereto appended.

The object of my present invention is to provide a simple and effective well cleaner, which is most universally practical owing to its capability of coping with the different conditions encountered in different wells and in different localities, and which moreover can be readily understood by and is safe to entrust to the average well worker, and may be used in connection with the customary oil field equipment. More specifically, the object of my invention is to provide a well cleaner which may be used not only for cleaning the perforations in the well casing and for loosening the caked formation immediately exterior thereto, in the manner described in my said pending application Ser. No. 546,587, but also for loosening and removing caked formation within and around the bottom of the casing, such for example as the caked mud which collects in the bottom and interferes with the production of a newly drilled well in which mud has been used in connection with the drilling operation, and for dislodging and removing any accumulated formation which may have settled above the device, and which would tend to prevent its removal. This latter function of my device may also be used to introduce fluid into the well above the cleaner, to counter-act, by its weight, the effect of fluid pressure below the cleaner, which might tend to elevate said cleaner and the tubing string to which it is secured. Further objects of my present invention are to provide means incorporated within the device itself to enable the operator at the surface of the ground accurately to determine the several positions of the selective control valve; to provide means for effectively enclosing the mechanism to prevent the ingress of sand thereinto; to provide a simple construction for relieving the control valve member of the weight of the entire device; and to provide means for enabling the device to be pulled out with the usual fishing tool in case it should become detached from the tubing string.

My well cleaner may be allowed to remain connected with the lower end of the tubing string in a flowing well, or with the bottom of the pump in a pumping well, the fluid passing through the device and into the pump or tubing string, thus saving the time and expense involved in pulling the tubing string whenever it becomes necessary to clean the perforated section of the casing.

My invention will now be fully described with reference to the accompanying drawings, wherein:

Fig. 1 is an elevation of my device suspended within the perforated section of a well casing, the casing being shown in section.

Fig. 2 is a partial central longitudinal section of my device.

Fig. 3 is an elevation of the upper portion of the valve tube, the stop rings being shown in section.

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 3.

Fig. 5 is an elevation of the central por-

tion of the mandrel, the packers and retaining dog mechanism being shown in section, and certain portions of the latter being omitted for the sake of clearness.

Fig. 6 is a horizontal section taken in the direction of the arrow on the line 6—6 of Fig. 5.

Fig. 7 is a horizontal section of the fluid director secured to the lower end of the mandrel, and is taken in the direction of the arrows on the lines 7—7 of Figs. 2 and 8.

Fig. 8 is a vertical section of the same taken on the line 8—8 of Fig. 7.

Figs. 9 and 10 are horizontal sections of the mandrel retaining dog mechanism, taken on two different planes represented respectively by the lines 9—9 of Fig. 11 and 10—10 of Fig. 12.

Figs. 11 and 12 are vertical sections of the same, taken respectively on the lines 11—11 and 12—12 of Fig. 10.

Fig. 13 is a horizontal sectional detail, enlarged, of the stop for limiting the outward movement of one of the retaining dogs.

Fig. 14 is a perspective view of one of the retaining dogs.

Fig. 15 is a part sectional plan, enlarged, of the stop pin holder ring shown in the upper portion of Figs. 2 and 3.

Fig. 16 is a perspective view of the stop pin.

Fig. 17 is a diagrammatic projection of the stop ring cam and the mandrel, showing the relative positions of the stop ring notches and the mandrel discharge ports. The ports of the valve tube are also shown, projected, in dotted lines.

Figs. 18 to 23, inclusive of both, are diagrams showing the arrangement of the open and closed ports in each operative position of the valve tube, the stop pin and a projection of the stop ring cam being shown in the upper portion, and a diagrammatic section of the mandrel and valve tube in the lower portion, of each figure.

In the drawings, and referring for the moment to Figs. 1 and 2 thereof, the reference numeral 1 designates the perforated section of a well casing, the perforations being designated by 2. 3 is the tubing string, to the lower end of which my improved perforation cleaner is secured, and by means of which it is supplied with the cleaning fluid, and its valve member operated. The cleaner itself comprises a tubular mandrel 4, which carries upper and lower spaced packers 5 and 6 respectively, formed of any suitable resilient material adapted to fit closely within the casing 1 to close the space between said casing and the mandrel 4. The lower packer 6 is retained between a nut 7, screwed upon the mandrel 4, and a ring 8 which bears against a shoulder 9 formed upon said mandrel and which is prevented from turning thereupon by a key 10, Fig. 5. Both the nut 7 and the ring 8 are formed with notches 11 for the engagement of a spanner wrench for convenience in assembling, and to prevent mutilation of the parts through the enforced use of pipe wrenches. By holding the keyed ring 8 with a spanner wrench, the entire mandrel may be held stationary while assembling or dismantling its associated threaded parts.

The upper packer 5 is similarly mounted between a notched nut 12, threaded upon the upper end portion of the mandrel, and a retaining dog mechanism indicated collectively in Figs. 1, 2, and 5 by 13, and which bears against a shoulder 14 formed upon said mandrel. The retaining dog mechanism 13 is provided for the purpose of engaging the perforations 2 of the casing 1, and thereby to prevent the rotation of the mandrel 4 when the cleaner is in functional position; and is therefore prevented from rotating upon the mandrel 4 by a key 15, Fig. 5. Said retaining dog mechanism is illustrated in detail in Figs. 9 to 14, and comprises three adjacent rings 16, 17 and 18, encircling the mandrel 4 and keyed thereto as above stated, and held together by screws 19, as shown in Fig. 12. An annular channel 20 is formed between the lower ring 16 and the middle ring 17, and in this channel are mounted horizontally swinging dogs 21. There are four such dogs shown in Fig. 9, arranged in pairs, the members of each pair being disposed oppositely to each other. However, the number and arrangement of the said dogs 21 may be changed if practical considerations render it expedient, the essential point being that at least one such dog must face in each direction.

The dogs 21 are provided with oppositely extending hubs 22, Figs. 11 and 14, which extend through and are journaled in holes in the spaced portions of the rings 16 and 17. The upper hub 22 of each dog extends into a channel 23 formed between the middle ring 17 and the upper ring 18, and is provided with a transverse slot 24, into which is fitted the end portion of a spring 25. There are two such springs for the four dogs arranged as shown in Fig. 10, each spring engaging two dogs. The springs 25 are retained in position endwise by being bent part way around the screws 19 at their center portions, and by having their ends bent over outside the hubs 22, as shown at 26 in Fig. 10. The upper ring 18 retains said springs within the slots 24, as shown in Figs. 10 and 11. The outer half of the upper hub 22 of each dog 21 extends farther than the inner half, and is adapted to engage a shoulder 27 formed upon the under surface of the upper ring 18, to limit the outward movement of the

dog, as shown in Figs. 11 and 13. Said shoulder 27 is flattened, as at 28, to permit the dog to have sufficient swinging movement. An annular guard 29, Figs. 10 and 12, encloses the space 23 between the rings 17 and 18 to prevent foreign matter from entering.

The dogs 21 are normally held in such position by the springs 25 that their outer ends project slightly beyond the rings 16 and 17, and bear against the inside of the casing 1, and in this position they are ready to engage the perforations 2, as shown at 30 in Fig. 9. Such an engagement as that shown at 30 would prevent the mandrel 4 from being moved within the casing in a clock-wise direction, and a slight movement thereof in the opposite direction would cause one of the oppositely disposed dogs to similarly engage a perforation. Thus the mandrel 4 is effectively locked against all but a slight rotative movement in either direction. The ends of the dogs 21 are rounded in a vertical plane as shown, so that any vertical movement of the device causes the engaged dogs to be moved inwardly and freed from the casing perforations. This rounded form of the dogs 21 also prevents them from catching upon obstructions or joints in the casing when the device is being raised or lowered. The dogs 21 are also rounded in a horizontal plane, on an arc whose center coincides with the center of the hubs 22, so that there is no danger of said dogs becoming jammed in case two or more happen to engage perforations at the same time.

Returning now to Fig. 2, the mandrel 4 carries within it a rotatable tubular valve member 31, which has a sleeve 32 permanently secured to its upper end, and said sleeve is provided with interior threads for engagement with the lower end of the tubing string 3, as shown at 33. The nut 12 of the upper packer 5 carries an integrally formed sleeve 34, which extends upwardly, inclosing the parts within, and is provided with an interior shoulder 35 adapted to engage the upper end of the valve coupling sleeve 32. Thus the entire weight of the device is carried by said coupling sleeve 32, the outer sleeve nut 34—12, and the mandrel 4, rather than by the valve tube 31. A set screw 36 is provided for retaining the sleeve nut 34—12 in position. The upper end portion of the outer sleeve 34 is provided on its exterior with flutes or beards 37, to enable the device to be engaged by a fishing tool in case the tubing string 3 should become detached. The lower end of the valve tube 31 is permanently closed by a plug 38, and the lower end of the mandrel 4 is closed by a removable plug 39, which forms a bearing for the bottom of the valve tube 31.

The mandrel 4 is provided with four distinct sets or groups of discharge apertures or ports, which are selectively controlled by the partial rotation, or more properly the oscillation, of the valve tube 31, said valve tube having similar groups of ports adapted to be moved into and out of register, by said oscillation, with the ports of the mandrel. All the ports of each group are controlled simultaneously. The preferred arrangement of the mandrel ports is shown in full lines in the diagram of Fig. 17, which represents the entire mandrel cylinder projected, but it is to be understood that the number and arrangement of such ports may be varied to suit structural requirements.

The upper group of ports 40 are positioned above the upper packer 5, and register permanently with similar ports in the sleeve 34. There are preferably two ports in this group, spaced 180 degrees apart, and on different levels. One such port 40 is shown in Fig. 2 and the other in Fig. 1. The center group is positioned between the upper packer 5 and the lower packer 6, and preferably comprises eight ports 41, arranged 90 degrees apart in two inclined planes, as shown in Fig. 17, the ports of the two planes being in vertical alignment. The third group is positioned below the lower packer 6, and preferably comprises seven ports 42, disposed similarly to and in vertical alignment with the ports 41. The fourth group is positioned at the lower end of the mandrel, below the third group, and preferably comprises two ports 43 spaced 180 degrees apart and in the same horizontal plane.

The preferred arrangement of the valve tube ports is shown in dotted lines in Fig. 17. The upper group preferably comprises four ports 40′ disposed in two horizontal planes corresponding with the planes of the mandrel ports 40, the two ports 40′ in each plane being spaced 60 degrees apart, and the ports in the two planes being spaced respectively 180 degrees apart. The second group comprises eight ports 41′, arranged in a manner similar to the mandrel ports 41. The third group comprises seven ports 42′, likewise arranged similarly to the mandrel ports 42. The fourth group comprises two ports 43′, spaced by 180 degrees in the same horizontal plane. This relative arrangement of the mandrel and valve ports is such that the several desired combinations of open and closed ports occur at regular intervals of 60 degrees in the rotation of the valve tube 31, as will be further explained hereinafter. There are, therefore, six effective positions of the valve tube, which positions are located and determined, by the operator at the surface of the ground, by the following mechanism.

At the upper end of the mandrel 4 is a sleeve or ring 44, Fig. 2, freely surrounding the valve tube 31, and prevented from rotating by inter-engaging tongues 45 formed upon itself and said mandrel. The upper edge of this ring 44, hereinafter called the stop ring, is formed with six notches, spaced 60 degrees apart to correspond with the six effective positions of the valve tube 31. These six notches, which are designated consecutively as 46^a, 46^b, 46^c, 46^d, 46^e, and 46^f and clearly shown in the projection of the stop ring 44 in the upper portion of Fig. 17, are adapted to be engaged by a stop pin 47 carried by a sleeve 48, Figs. 2, 3 and 4. Said sleeve 48 is free to slide vertically on the valve tube 31, but is prevented from turning thereupon by feathers 49 preferably formed integrally with said valve tube. A spring 50, interposed between the coupling sleeve 32 and said sleeve 48, keeps the stop pin 47 in engagement with the upper notched edge of the stop ring 44. The stop pin 47 is preferably formed separately from its holder sleeve 48, to permit its ready renewal in case of wear, and to this end is formed upon an arcuate block 51, Figs. 2, 15 and 16, with rounded edges 52, and adapted to be driven into a suitably formed notch in the holder sleeve 48. The top of said block 51 may be provided with a notch 53 to enable the ready insertion of a punch or other tool for removing said block from its holder 48.

The stop pin 47, backed by its spring 50, therefore travels over the irregular surface of the stop ring 44 during the oscillation of the valve tube 31, the several effective positions of said valve tube being indicated to the operator by the amount of resistance offered to the turning of the tubing string to which said valve tube is attached by the engagement of said stop pin 47 with the various notches of said stop ring 44. Two of these positions, corresponding with the notches 46^a and 46^f, are located by positive stops formed by the vertical sides of a tongue 54, Fig. 17, formed between said notches 46^a and 46^f, and which prevents the stop pin 47 from traversing this portion of the ring. Thus the movement of the valve tube 31 is restricted to an oscillation through an arc of 300 degrees. The remaining positions of said valve tube are located by impositive or indicative stops formed by the engagement of the pin 47 with the notches 46^b, 46^c, 46^d and 46^e, and these are differentiated from each other by the varying degrees of resistance offered to the turning of the tubing string by the various shapes and depths of said notches. Thus in turning the valve tube to carry the pin 47 from the notch position 46^a to 46^b, a constant but comparatively slight resistance is encountered, due to the inclination of the stop ring between these two notches. In moving away from the position 46^b, an initial strong resistance is felt, due to the relatively steep sides of the notch 46^b, which resistance is greater when moving toward the position 46^c than 46^a. The notch 46^e produces the same effect as 46^b, but the directions are reversed. The notch 46^d produces a relatively slight resistance in both directions. The position 46^c may be easily determined by its relation to the positions 46^d and 46^f, the latter being a positive stop.

The lower end of the mandrel 4 is provided with a fluid director, comprising a sleeve 55, Figs. 1, 2, 7 and 8, which is fitted over said mandrel end and retained thereon by any suitable means, as for example, a set screw 56. An interior shoulder 57 serves to lock the mandrel plug 39 in position. Said sleeve 55 is provided with an annular interior groove 58 near its upper end, which registers with and covers the mandrel ports 43 of the lowermost or fourth group described above. From this groove 58 are led passages 59, Fig. 8, extending downwardly through the wall of the sleeve 55, and adapted to discharge the fluid issuing from the ports 43 in a downward direction.

The operation of the valve tube 31 in the control of the several groups of mandrel ports 40, 41, 42 and 43 can best be understood by reference to the diagrams of Figs. 18 to 23 inclusive, wherein are shown the six effective control positions of said valve tube referred to above. In the upper portion of all of these diagrams are shown projections of the stop ring 44, with the stop pin 47 in its six positions, and below are represented the mandrel 4 and the valve tube 31, indicating the open and closed ports at each such position of the stop pin. It is to be understood that these views are merely diagrams for indicating the effect on said ports of the movement of the valve tube, no attempt having been made to show the actual positions of said ports except in so far as such positions may relate to their proper functions.

In Fig. 18 the stop pin 47 is at the position 46^a, and all ports are closed. In Fig. 19 the stop pin 47 is in the position 46^b, and only the intermediate group of ports 41, between the packers 5 and 6, are open. In Fig. 20 the stop pin 47 is in the position 46^c, and only the lowermost, or fourth group of ports 43 are open, said ports discharging the fluid downwardly through the fluid director, not shown in Fig. 20. In Fig. 21 the stop pin 47 is in the position 46^d, and all ports are again closed. In Fig. 22 the stop pin is in the position 46^e, and only the uppermost group of ports 40, above the upper packer 5, are open. In Fig. 23 the stop pin 47 is in the position 46^f, and all ports except those of the second group, 41, are open, that

is, the ports 40 above the upper packer 5, and the ports 42 and 43, below the lower packer 6, are open.

In the operation of my improved perforation cleaner, the device is secured to the bottom of the tubing string and lowered into the well in the usual manner, the valve tube 31 being in the position shown in Fig. 23, to permit the fluid in the well to pass freely through the ports 43 and 42, the valve tube 31 and the ports 40, and thereby to prevent interference with the downward movement of the device. When the perforated section of the casing 1 (shown only in Fig. 1) is reached, the valve tube is turned by means of the tubing string 3, to the position shown in Fig. 18, in which all ports are closed. At this position the positive stop 54 prevents clockwise movement of the valve tube, so that if necessary, the screw joints of the tubing string may be tightened by turning said tubing string in a clockwise direction. Fluid under pressure, from any suitable source not shown in the drawings, is now supplied to the tubing string and valve tube, and when such pressure builds up to the desired point as evidenced, for example, by a pressure gauge (not shown) connected with the tubing string or supply conduit, the tubing string is turned in a counter-clockwise direction, until the first impositive stop is reached, and the pressure drops. The valve tube is now in the position shown in Fig. 19, the fluid being forcibly discharged through the ports 41 between the packers 5 and 6, and consequently being forced out through the perforations of the casing situated between said packers. This clears said perforations and dislodges and loosens any caked formation that may adhere to the outside of the casing, the fluid passing up outside said casing and returning into it through the perforations above the upper packer 5. By shifting the position of the cleaner and repeating this process in each new position, the entire perforated section of the casing can be cleaned.

If it is desired to clean the bottom of the well, as for example to loosen and remove caked formation such as the mud left in a new well from rotary drilling, the valve tube is first turned to the position shown in Fig. 21, in which all ports are closed. This position can be easily determined, not only by the equal and constant resistance encountered when turning the tubing string in either direction, but also by the fact that the pressure of the fluid therein rapidly builds up, all discharge ports being closed. A movement of 60 degrees in a clockwise direction, or until the first indicative stop is reached, brings the valve tube to the position of Fig. 20, opening only the lowermost group of ports 43, and discharging the fluid downwardly through the fluid director shown in Figs. 1 and 2, thereby washing out the bottom of the well. A similar movement in the opposite direction from the position of Fig. 21 opens only the uppermost group of ports 40, as in Fig. 22, discharging the fluid into the casing above the upper packer 5. This position is useful for loosening any caked formation that may have settled above the cleaner and which might interfere with the pulling of the device from the well. It is also useful for introducing a column of fluid into the casing above the cleaner, to counteract, by its weight or pressure, any gas or other fluid pressure below the cleaner, which might tend to force said cleaner and the tubing string upward and cause damage.

My improved cleaner may be left in a well, attached to the bottom of the tubing string or to the bottom of the well pump, according to whether the well is flowing or pumping, to obviate the necessity of pulling the tubing string every time the well needs cleaning. With the valve tube in the position shown in Fig. 23, the oil can flow into the pump or tubing string through the ports 42 and 43. The pressure is equalized between the casing and the tubing string by the open upper ports 40, but by sealing the casing at the surface in the usual manner, the entire flow can be directed through the tubing string, thus eliminating wear on the casing due to sand carried in suspension in the oil. The device may also be used as a packer at any desired depth in the well, the desired fluid being admitted to the tubing string through either the upper or lower ports as circumstances may demand.

The preferred form of the stop ring 44, as shown in the drawings and described above, enables the operator to determine the various positions of the valve tube 31 with the greatest possible ease and accuracy. The most frequent movement of said valve tube is between the positions of Figs. 18 and 19, and in moving from the former to the latter position, there is a constant and relatively slight resistance to the turning force. The position of Fig. 19 is readily recognized by a sudden increase in this resistance, due to the engagement of the pin 47 with the notch 46^b, while the absence of any pronounced notch at 46^a prevents the valve tube from jumping ahead due to the resilience of the tubing string, and possibly passing the notch 46^b. The position of Fig. 18, and also that of Fig. 23, are easily determined by the positive stop 54. The next most frequently employed movements of the valve tube 31 are from the position of Fig. 21 to either that of Fig. 20 or Fig. 22; and in these cases the effects are the same as described above for the movement from the position of Fig. 18 to that of Fig. 19. The inclination of the surface of the stop ring 44

is sufficient to hold the valve tube 31 in the positions of Figs. 18, 21 and 23, although permitting its ready movement away from these positions.

My improved device is readily accessible for cleaning and repair. The valve tube 31 and the entire stop mechanism can be removed by removing the sleeve nut 34—12, which encloses said stop mechanism and also relieves the valve tube from the weight of the device and the pulling strains incident to the friction of the packers 5 and 6 against the well casing 1. The parts most subject to wear, viz, the stop ring 44 and the stop pin 47, are both removable and can be replaced without removing any other parts.

I claim:—

1. A well cleaner comprising a chambered member adapted to be suspended within the well casing and having two spaced fluid discharge ports communicating with its interior, a packer carried by said member between said ports and adapted for closing the space between said member and the casing; means for selectively opening and closing either or both ports; and means for supplying fluid to the interior of said member.

2. A well cleaner comprising a chambered member adapted to be suspended within the well casing and having two spaced fluid discharge ports; a packer carried by said member between said ports and adapted for closing the space between said member and the casing; a movable valve member for selectively opening and closing either or both ports; means for indicating and differentiating between the several port control positions of said valve member; and means for supplying fluid to said chambered member.

3. A cleaner for well casings comprising a chambered member adapted to be suspended within the well casing and having a plurality of spaced fluid discharge ports; spaced packers carried by said member for closing the space between it and the casing, said packers separating said discharge ports into a plurality of groups; means for selectively opening and closing any group of discharge ports; and means for supplying fluid to said chambered member.

4. A cleaner for well casings comprising a chambered member adapted to be suspended within the well casing and having a plurality of spaced fluid discharge ports; spaced packers carried by said member for closing the space between it and the casing, said packers separating said discharge ports into a plurality of groups; a movable valve member for selectively opening and closing any group of discharge ports; means for indicating and differentiating between the several port control positions of said valve member; and means for supplying fluid to said chambered member.

5. A cleaner for well casings comprising a chambered member adapted to be suspended within a well casing and having two fluid discharge ports; a packer carried by said member for closing the space between it and the casing; a valve member adapted to be moved to a plurality of positions for opening and closing either or both of said ports; and means for supplying fluid to said chambered member.

6. A cleaner for well casings comprising a chambered member adapted to be suspended within a well casing and having two fluid discharge ports; a packer carried by said member for closing the space between it and the casing; a valve member adapted to be moved to a plurality of positions to open and close either or both ports; cooperating devices carried by said chambered member and said valve member for indicating the several port control positions of said valve member; and means for supplying fluid to said chambered member.

7. A cleaner for well casings comprising a chambered member adapted to be suspended within a well casing and provided with a plurality of independently controllable fluid discharge ports; means for directing the fluid discharged from one of said ports in a downward direction; a packer carried by said member for closing the space between it and the casing above the last mentioned port; and means for supplying fluid to said chambered member.

8. A cleaner for well casings comprising a chambered member adapted to be suspended within a well casing and provided with a plurality of independently controllable fluid discharge ports; a fluid director removably associated with the lower end of said member for directing the fluid discharged from one of said ports in a downward direction; a packer carried by said member for closing the space between it and the casing; and means for supplying fluid to said chambered member.

9. A cleaner for well casings comprising a chambered member adapted to be suspended within a well casing and provided with a fluid discharge port; a valve associated with said member and adapted for oscillation to control said port; a packer carried by said member for closing the space between it and the well casing; means for supplying fluid to said member; and a movable dog carried by said member for engaging the well casing to prevent said member from turning within said casing.

10. A cleaner for well casings comprising a chambered member adapted to be suspended within a well casing and provided with a fluid discharge port; a valve associated with

said member and adapted for oscillation to control said port; means for supplying fluid to said member; and a pair of dogs carried by said member for engaging the well casing to prevent said member from turning within said casing, said dogs being pivotally mounted for opposite swinging movement in a horizontal plane.

11. A cleaner for well casings comprising a chambered member adapted to be suspended within a well casing and provided with a fluid discharge port; a valve associated with said member and adapted for oscillation to control said port; means for supplying fluid to said member; a dog carried by said member and adapted for outward movement to engage the well casing to prevent said member from turning within said casing; and a spring for pressing said dog into engagement with said casing; and means for limiting the outward movement of said dog.

12. A cleaner for perforated well casings comprising a chambered member adapted to be suspended within the well casing and provided with a fluid discharge port; a valve associated with said member and adapted for oscillation to control said port; means for supplying fluid to said member; a movable dog carried by said member and adapted to engage the perforations of the casing to prevent said member from turning therewithin, the effective end of said dog being rounded in a vertical plane to cause it to disengage the perforations upon vertical movement of the member; means for resiliently pressing said dog outwardly into engagement with the perforations of said casing; and means for limiting the outward movement of said dog.

13. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; means for supplying fluid to said mandrel; a movable valve member for selectively controlling said ports; positive stops adapted to be engaged by said valve member at the opposite limits of its movement; and an impositive stop adapted to be engaged by said valve member for indicating a port control position thereof between said positive stops.

14. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; means for supplying fluid to said mandrel; a movable valve member for selectively controlling said ports; positive stops carried by said mandrel for limiting the movement of said valve member; an impositive stop carried by said mandrel for indicating a port control position of said valve member between said positive stops; and means carried by said valve member for engaging said positive and impositive stops.

15. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; means for supplying fluid to said mandrel; a movable valve member for selectively controlling said ports; a member carried by said mandrel and provided with positive and impositive stops; and means carried by said valve member for engaging the stops of said mandrel member to indicate the several port control positions of said valve member.

16. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; means for supplying fluid to said mandrel; a movable valve member for selectively controlling said ports; a member carried by said mandrel and provided with a notched surface; and means carried by said valve member for engaging the notches of said mandrel member to indicate the several port control positions of said valve member.

17. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; means for supplying fluid to said mandrel; a movable valve member for selectively controlling said ports, a member carried by said mandrel and provided with spaced projections and a notch therebetween; and means carried by said valve member for engaging said projections to limit its movement and for engaging said notch to indicate a port control position of said valve member between such limits.

18. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; a hollow valve member adapted for oscillation within said mandrel to selectively control said ports; means for supplying fluid to said valve member; a stop ring carried by said mandrel and provided with an irregular surface; and a stop pin carried by said valve member and adapted to engage the irregularities of said ring to indicate the several port control positions of said valve member.

19. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; a hollow valve member adapted for oscillation within said mandrel to selectively control said ports; means for supplying fluid to said valve member; a stop ring carried by said mandrel and provided with an irregular surface; a lug projecting from said surface;

and a stop pin carried by said valve member and adapted to engage said lug to limit the oscillation of said valve member and to engage the irregularities of said ring to indicate the port control positions of said valve member between such limits.

20. A cleaner for well casings comprising a hollow mandrel adapted to be suspended within the well casing and provided with a plurality of fluid discharge ports; a hollow valve member adapted for oscillation within said mandrel to selectively control said ports; means for supplying fluid to said valve member; a ring carried by said mandrel and provided with an irregular surface; a second ring slidably mounted on said valve member for movement toward and away from the first ring; a stop pin carried by the second ring and adapted to travel over and engage the irregularities of the first ring to indicate the several port control positions of said valve member; and means for resiliently holding said stop pin in engagement with the irregular surface of the first ring.

21. In a device for the described purpose, a hollow mandrel provided with fluid discharge ports; a tubular valve member mounted for oscillation within said mandrel to control said ports, said valve member being adapted for connection with the tubing string of the well and having an exterior shoulder; and a sleeve associated with the mandrel and provided with an interior shoulder adapted to engage the exterior shoulder of said valve member to support the mandrel therefrom.

22. In a device of the described purpose, a hollow mandrel provided with fluid discharge ports; a tubular valve member mounted for oscillation within said mandrel to control said ports, said valve member being adapted for connection with the tubing string of the well and having an exterior shoulder; mechanism for indicating the port control positions of said valve member; a removable sleeve associated with said mandrel and inclosing said mechanism; and an interior shoulder formed upon said sleeve and adapted to engage the exterior shoulder of said valve member to support the mandrel therefrom.

23. In a device for the described purpose, a hollow mandrel provided with fluid discharge ports; a packer carried exteriorly upon said mandrel and adapted to close the space between said mandrel and the well casing; a tubular valve member mounted for oscillation within said mandrel to control said ports, said valve member being adapted for connection with the tubing string of the well and having an exterior shoulder; a nut for retaining said packer in position upon said mandrel; and a sleeve carried by said nut and provided with an interior shoulder adapted to engage the exterior shoulder of said valve member to support the mandrel therefrom.

24. In a device for the described purpose, a hollow mandrel provided with fluid discharge ports; a packer carried exteriorly upon said mandrel and adapted to close the space between said mandrel and the well casing; a tubular valve member mounted for oscillation within said mandrel to control said ports, said valve member being adapted for connection with the tubing string of the well and having an exterior shoulder; a nut for retaining said packer in position upon said mandrel; and a sleeve carried by said nut and provided with an interior shoulder adated to engage the exterior shoulder of said valve member to support the mandrel therefrom, said sleeve being provided with an exterior substantially horizontal groove adapted for engagement by a fishing tool.

25. A cleaner for well casings comprising a hollow mandrel having four fluid discharge ports disposed throughout its length; upper and lower spaced packers carried by said mandrel for closing the space between it and the casing, there being one port above the upper packer, one port between the two packers, and two ports below the lower packer; a valve member carried by said mandrel for selectively controlling said ports; and means for directing the discharge from the lowermost port in a downward direction.

In testimony whereof I have signed my name to this specification.

ALONZO LEWIS HALLIDAY.

Nov. 4, 1924. 1,514,585

C. R. EDWARDS

TESTING DEVICE FOR OIL WELLS

Filed Jan. 17, 1921

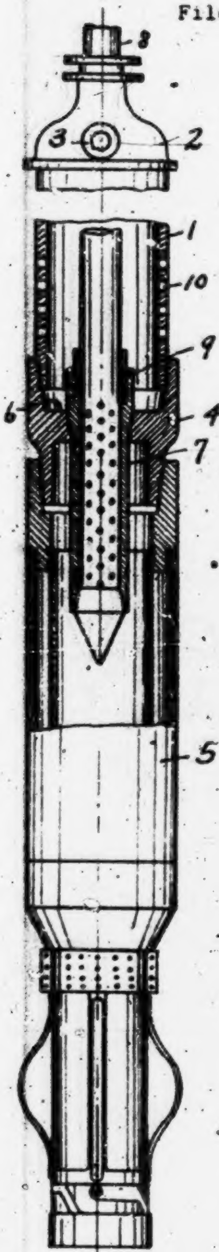


Fig. 1.

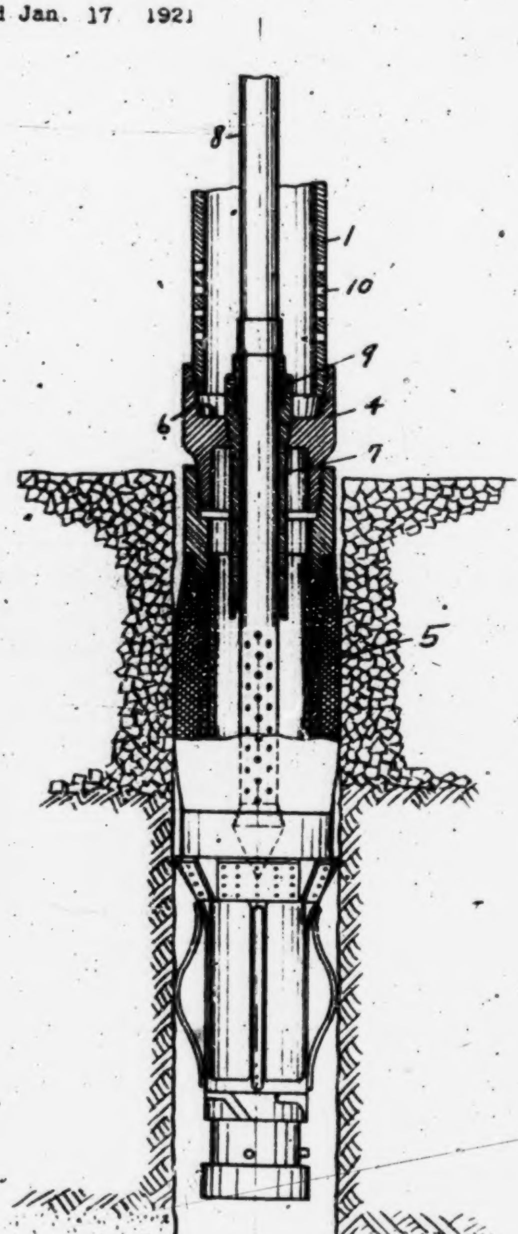


Fig. 2.

Inventor
Charles R. Edwards

By Hardway & Cathey
Attorneys

Patented Nov. 4, 1924. **1,514,585**

UNITED STATES PATENT OFFICE.

CHARLES R. EDWARDS, OF HOUSTON, TEXAS.

TESTING DEVICE FOR OIL WELLS.

Application filed January 17, 1921. Serial No. 437,972.

To all whom it may concern:

Be it known that I, CHARLES R. EDWARDS, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in a Testing Device for Oil Wells, of which the following is a specification.

This invention relates to new and useful improvements in a testing device for oil wells.

One object of the invention is to provide a device of the character described which is specially adapted for testing the strata, being pierced, in drilling oil, gas or other wells, for the purpose of determining the presence or absence of oil, gas or other fluids.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of the device, and

Figure 2 is a side elevation, partially in section, showing the well packer set.

Referring now more particularly to the drawings, the numeral 1 refers to a pipe, usually the ordinary drill stem which is let down into the bore as drilling progresses. The upper end of the pipe carries the casing head 2, having the hose connection 3, through which water or slush is forced into the interior of the pipe by means of the ordinary slush pump commonly used for the purpose.

Threaded onto the lower end of the pipe there is a nipple 4 to which the packer 5 is attached. This packer is provided to separate any stratum that may be encountered from any other stratum to be tested. This packer is of the usual construction, well known to those familiar with the art of drilling wells.

The nipple 4 has a seat 6 and depending therefrom there is a surrounding sleeve 7 whose lower end has internal threads.

A stem 8 is fitted through the casing head 2 and the sleeve 7 fits over the lower end of this stem and is threaded thereon. The lower end of the stem is closed and preferably pointed and the section thereof within the sleeve 7 is perforated. The upper end of the sleeve is formed with a stuffing box 9 through which the stem fits and which forms a water tight joint therewith.

In drilling, water, laden with mud, is forced under pressure of the pump, down into the bore to carry away the cuttings from the drill. This operation makes it difficult to test the strata for oil with the ordinary drilling equipment. With my apparatus, when it is desired to make a test, the drill pipe with the nipple 4 and the perforated lower end attached to the packer is lowered to near the bottom of the well; then the test stem 8, together with the sleeve 7, is lowered to a point above the seat 6 and water is then pumped down through the casing head 2 to wash out the bottom of the well by forcing water down the inside of the pipe 1 past the test stem 8 and the seat 6, to below the packer, thoroughly washing the stratum to be tested. The packer is then raised, tripped and set. The test stem is seated on the seat 6 and the slush pump started pumping in mud down the pipe 1, out through its perforated lower end and up so as to maintain the wall. After a time so as to let the water settle away and oil, gas or other fluid to accumulate, the test stem is screwed to the right, thus unscrewing it from the sleeve 7 and the test stem 8 is lowered. If there be any pressure of oil, gas or other fluid it will now rush through the perforated section of the stem 8, and up the stem and if there be sufficient pressure of the oil, gas or other fluid from the stratum below the packer, it will push a stream of the same from the top of said stem. By placing an ordinary working barrel at any suitable point in the test stem 8, if the pressure of the oil, or other fluid should not be great, the pump in the working barrel can be started and the fluid forced out through the stem 8, thus completely testing the stratum under investigation, both as to quality and quantity of flow of the fluid, and if oil or gas under enormous pressure is encountered, the superpressure may be relieved before attempting to set regular casing.

To withdraw the apparatus the packer is first released before stopping the slush pump and the test stem is then withdrawn before withdrawing the drill pipe and packer.

What I claim is:—

1. The combination with a packer adapt-

ed to be set in a well bore, of a stem provided to be inserted through said packer and adapted to communicate with the bore beneath said packer and permit fluid to be forced from the stratum, below said packer.

2. The combination with a packer adapted to be set in a well bore, of a tubular stem fitted through said packer, and normally blocking the same against the passage of fluid therethrough, the lower end of the stem being provided with an inlet through which the stem communicates with the bore beneath the packer when the stem is lowered through said packer.

3. The combination with a casing whose lower end is perforated, of a packer attached to the lower end thereof, and adapted to be set in a well bore, a stem fitted through the packer and at all times closing the packer against the flow of fluid from the casing downwardly therethrough, said stem, while in one position, excluding the flow of fluid therethrough from the bore beneath the packing and while in another position permitting fluid to flow from beneath the packer upwardly therethrough.

4. The combination with a casing whose lower end is perforated, of a packer attached to the lower end thereof, a sleeve within the packer, a stem within the casing whose lower end is fitted through the sleeve, the lower end of the stem being closed and the section thereof within the packer being perforated.

5. The combination with a packer adapted to be set in a well bore and having an internal fluid passageway, of a stem adapted to be inserted into said passageway to block the same, said stem being adapted to be lowered through the packer, and when in lowered position communicating with the bore beneath the packer and adapted to permit the forcing of fluid through said stem from the strata, below said packer.

6. The combination with a packer adapted to be set in a well bore, of a tubular stem fitted through said packer and normally blocking the same against the passage of fluid therethrough, the lower end of said stem being provided with an inlet which is closed when the stem is in said blocking position, said stem being capable of being lowered beneath the packer and when in lowered position to communicate through said inlet with the bore beneath the packer.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES R. EDWARDS.

Witnesses:
R. M. SMITH,
WM. A. CATHEY.

DISCLAIMER

1,514,585.—*Charles R. Edwards*, Houston, Tex. TESTING DEVICE FOR OIL WELLS. Patent dated November 4, 1924. Disclaimer filed July 3, 1930, by the patentee.

Hereby enters this disclaimer to so much of claim 1 of said patent as is in excess of the following:

In an apparatus for testing the productivity of a stratum exposed in a well while containing drilling fluid which might substantially prevent a flow from said stratum, the combination with a packer adapted to be set in a well bore, of a stem provided to be inserted through said packer and adapted to communicate with the bore beneath said packer to relieve pressure of said fluid against said exposed stratum and permit fluid to be forced from the stratum, below said packer.

Your petitioner also hereby enters this disclaimer to so much of claim 5 of said patent as is in excess of the following:

In an apparatus for testing the productivity of a stratum exposed in a well while containing drilling fluid which might substantially prevent a flow from said stratum, the combination with a packer adapted to be set in a well bore and having an internal fluid passageway, of a stem adapted to be inserted into said passageway to block the same, said stem being adapted to be lowered through the packer, and when in lowered position communicating with the bore beneath the packer and adapted to permit the forcing of fluid through said stem from the strata, below said packer.

Your petitioner also hereby enters this disclaimer to so much of claim 6 of said patent as is in excess of the following:

In an apparatus for testing the productivity of a stratum exposed in a well while containing drilling fluid which might substantially prevent a flow from said stratum, the combination with a packer adapted to be set in a well bore, of a tubular stem fitted through said packer and normally blocking the same against the passage of fluid therethrough, the lower end of said stem being provided with an inlet which is closed when the stem is in said blocking position, said stem being capable of being lowered beneath the packer and when in lowered position to communicate through said inlet with the bore beneath the packer.

[*Official Gazette July 22, 1930*]

DISCLAIMER

1,514,585.—*Charles R. Edwards*, Houston, Tex. TESTING DEVICE FOR OIL WELLS. Patent dated November 4, 1924. Disclaimer filed March 8, 1932, by the patentee.

Hereby enters this disclaimer as follows:

He, said patentee, disclaims any interpretation of any of the claims, 1 to 6, inclusive, in the patent which does not restrict said claims to a device that is capable of closing the test stem to the entrance of fluid from the bore beneath the packer by motion of the stem while the packer is set.

[*Official Gazette April 5, 1932.*]

n. 6, 1925. 1,522,197

G. A. MACREADY

METHOD FOR MAKING PRODUCTION TESTS IN WELL DRILLING

Original Filed July 25, 1922

Fig.1.

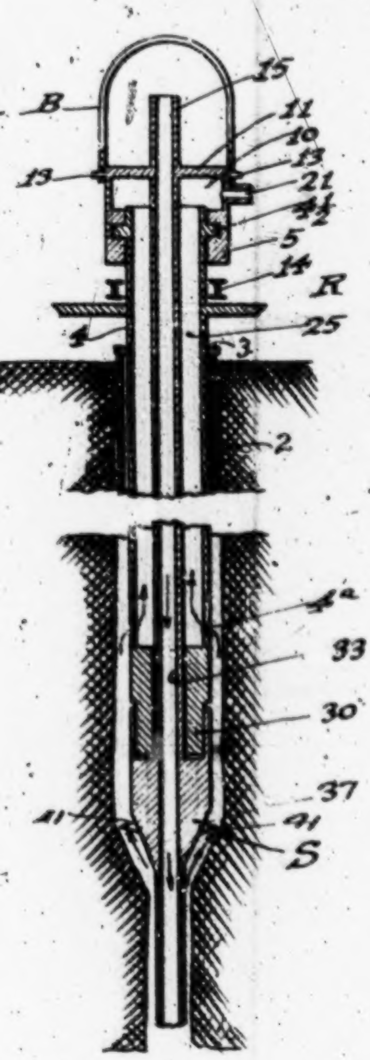
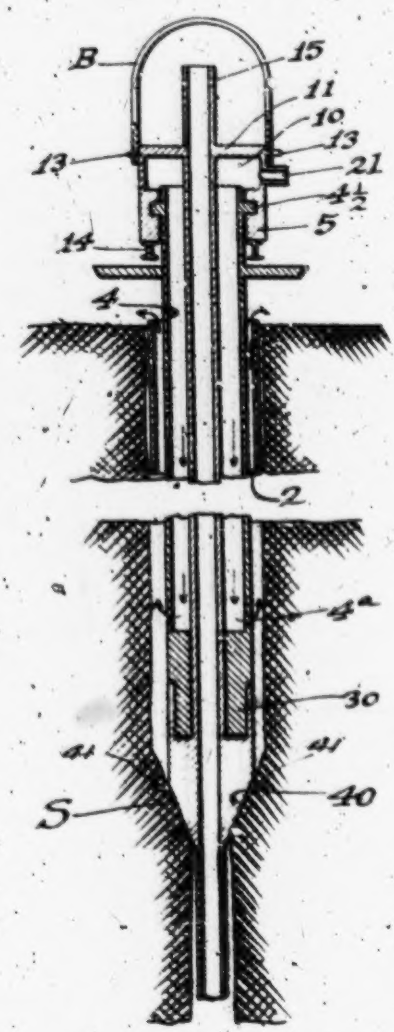


Fig.2.



Inventor:
GEORGE A. MACREADY
By Hazard & Miller
Attorneys

Witness:

Patented Jan. 6, 1925. **1,522,197**

UNITED STATES PATENT OFFICE.

GEORGE A. MACREADY, OF LOS ANGELES, CALIFORNIA.

METHOD FOR MAKING PRODUCTION TESTS IN WELL DRILLING.

Original application filed July 25, 1922, Serial No. 577,433. Divided and this application filed August 2, 1923. Serial No. 655,205.

REISSUED

To all whom it may concern:

Be it known that I, George A. Macready, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in a Method for Making Production Tests in Well Drilling, of which the following is a specification.

This is a division of my application Serial No. 577,433, filed July 25, 1922, for apparatus and method for making production tests in deep well drilling.

This invention relates to an improved method for facilitating the making of production tests of the lower portions of deep wells so as to determine the proper point at which the well is to be sealed off so as to cut off water from above the oil bearing strata.

It is an object of the present invention to provide a method for shutting off water and for maintaining a circulation in a deep well preparatory to and while making a production test so as to insure the recovery of the apparatus utilized by keeping it from being frozen in the well or jammed. A further object is to maintain a circulation in a well and apparatus and at the same time rotate a portion of the apparatus during the production test. Another object is to provide for the washing of the well by introducing clean water during the lowering of the testing apparatus utilized to a previously formed packer seat.

An object is to provide for the removal of the washings from the well during the lowering of the packer by passing the washings between inner and outer pipes of the apparatus to prevent scouring of the wall of the well above the packer and effect rotation of the outer pipe while the washing circulation is maintained. It is, therefore, broadly, an object of the invention to provide a washing circulation in which the discharge water from the well passes up in through the apparatus and not directly along the well wall.

Another object is to provide a method for facilitating production tests and for aiding in determining the permanent sealing zone and for maintaining circulation, and to provide for maintaining, by rotation, a free circulating pipe whereby the packer may be recovered after performance of function.

Other objects and advantages will be made manifest in the following specification of the preferred method comprising the present invention as effected by apparatus illustrated in the accompanying drawings, in which:

Figure 1 is a diagrammatic, vertical, longitudinal section of the apparatus in the step of being lowered to a temporary sealing position.

Fig. 2 is a longitudinal, vertical section of the apparatus in its effective sealing and circulation maintaining position.

The present method may be practiced and effected by an apparatus illustrated in the accompanying drawings including a string of pipes and a packing section at the foot thereof and a swivel case at the head thereof, the pipes of which are capable of being bodily lowered, excepting at the swivel top mechanism, into the well casing 2, of suitable diameter, and at the top of which is a stuffing box 3, Figure 1, surrounding an outer pipe 4 of such diameter as to form a suitably sized cylindrical passageway within the casing 2.

The swivel case 5 is provided with an open upper end and forms a suitable chamber 10 which is closed as by a retaining cap 11 mounted on the rim of case 5. This latter is shown as provided with diametrically opposite trunnions 13 to be engaged by any suitable elevating and suspending means for such period of time as may be necessary in lowering the apparatus into the well hole after which the case 5 is lowered to a suitable support, as for instance a set of supporting beams 14, Figure 2. This enables the throwing of the elevating mechanism of the string out of connection and facilitates the application of other appurtenances, as for instance to connect a small swivel of circulating pipes to the top of an inner pipe 15. This also provides for the step of bailing the well through the inner pipe 15 when the swivel case 5 is stationary on a permanent support.

A form of mechanical construction providing for the rotation of the top pipe section 4 includes an annular shoulder 4½ provided on this top section.

Circulation into and from the swivel case chamber 10 is provided by any suitable connection as a lateral coupling 21 which may be connected to the circulation pumps or otherwise as may be necessary so that water

can be forced down in the outer pipe 4 or can flow up through the outer pipe 4.

The head pipe section 15 is of sufficiently small diameter to provide an ample passageway 25 within the pipe section 4.

The inner string of pipe 15 includes a foot section of hollow spindle 33. The hollow spindle passes down and rotatably fits in the bearing sleeve 30. The packer body 37 has an effective packing exterior lower portion which is preferably tapered so as to form a good seal upon a previously cut seat prepared therefor in the well hole.

From the above it will be seen that when the elevating and suspending bail device, B, Fig. 1, is attached to the swivel case trunnion 13, the whole string of inner and outer pipes 15 and 4 are carried by the casing swivel and the outer pipe is adapted to be rotated by the usual rotary table R of a rotary drilling apparatus. While the string of packer elements are being lowered into the well, rotation can be maintained by the rotary table R of the outer pipe 4, while the inner pipe and the packer attached to the packing spindle 33 thereof being connected by a swivel joint at the bottom of the string in the bearing 30 does not rotate. During the lowering of the string, circulation is maintained by a flow of circulation fluid entering the top of the inner pipe 15, thence down to the bottom of the inner pipe where it discharges freely into the well and passes up to the surface thereby preventing the pipe from sticking. Just before seating of the packer, circulation is maintained as by a flow of water entering the top of the inner pipe 15, and thence down to the bottom of the inner pipe where it discharges freely into the well and passes up outside of the lower inner pipe and around the packer 37 as is shown in Fig. 1, and thence up until the water may find access into the outer pipe 4. This access and escape from the well hole is provided by a series of apertures 4ᵃ in the lowermost section of the pipe 4 just above the foot swivel and bearing member 33. The stuffing box 3 being closed, prevents the water from going up outside of pipe 4 thereby avoiding scouring the walls of the hole. The upwardly flowing water passes freely into the space between the inner pipe 15 and the outer pipe 4 and thus does not rise along the well wall and the scouring of the wall is prevented above the packer. The water entering the pipe 4 passes to the top thereof and escapes through the lateral connection 21 as indicated in Fig. 1.

When the packing string has been lowered to the necessary position, the packing facing 40 engages the seat S provided therefor in the well hole and becomes fixed and solidly seated and is held against rotation upon the seat or by the interlocking of the holding prongs 41 engaging in the wall. As soon as the packer has become seated, it will be seen that upflow from below is prevented except through the innermost or central pipe 15. This is open continuously from top to bottom and provides for the bailing of the bottom of the well and for such other steps as may be taken in the production test.

When the packer is seated, mud circulation may be maintained from the pump system by forcing the fluid into port 21 of the swivel case at the head of the well wall when this is seated on its permanent supports 14. The fluid is forced down through the space between the inside pipe 15 and the outside pipe 4 and discharges outwardly through the openings 4ᵃ and passes upwardly along the surface of the well and plasters the wall above the packer. This fluid circulation prevents the pipe sticking or freezing to the walls of the well. The upwardly flowing circulating mud is discharged through the well casing at the head of the well.

It will be seen also that the weight of the columns of pipes upon the seated packer can be readily regulated by the amount of weight of the swivel head and apparatus that is superimposed on the permanent supports 14 upon which the swivel case is lowered after the packer has become seated. The advantage of this is that considerable strain is removed from the packer and also from the string of pipe sections and their joints throughout the string.

This method provides for the constant motion of the outer pipe string 4 while it is being lowered into the hole and after the packer has become firmly seated and provides also for the downward or upward circulation or flow of liquid in the space between the two pipes, and also between the outer pipe and well wall, and all of this with the object of insuring the possibility of recovering the apparatus from the well.

Further embodiments, modifications and variations may be resorted to within the principle of the invention.

What is claimed is:

1. A method for making production tests in drilled wells before permanently sealing the well which consists in lowering a packer into the well to engage a previously formed seat, and maintaining a circulation of clean water down through the packer apparatus and up through the lower portion of the well and into the packer apparatus and to wash mud from well wall below the packer.

2. A method for making production tests in drilled wells before permanently sealing the well which consists in lowering a packer into the well to engage a previously formed seat, maintaining a circulation of clean water down through the packer apparatus and up through the lower portion of the well and into the packer apparatus to wash mud from the well wall below the packer

without scouring the wall of the well above the packer, and constantly moving parts of the packer apparatus while the circulation is being maintained.

3. A method for making production tests in drilled wells before permanently sealing the well which consists in lowering a packer into the well to engage a previously formed seat, and maintaining a circulation of clean water down through the center of the packer apparatus and up through the lower portion of the well and into the packer apparatus to facilitate insertion of the apparatus without scouring the wall of the well above the packer.

4. A method for making production tests in drilled wells before permanently sealing the well which consists in lowering a packer into the well to engage a previously formed seat, and maintaining a circulation of clean water down through one channel of the packer apparatus and up through the lower portion of the well and into channels of the packer apparatus.

5. In a well drilling process, sealing a drilled well by a removable packer apparatus and maintaining a circulation in and out of the apparatus after the packer is placed upon a seat therefor in the well.

6. In a well drilling process, sealing a deep well by a removable packer apparatus, constantly moving elements of the packer while the latter is stationary on its seat to prevent the outer elements from freezing in the well, and maintaining a circulation in the packer apparatus above the packer so as to plaster the wall of the well above the stationary packer.

7. In a well drilling process, inserting a packing and bailing apparatus in a drilled hole and resting a head part of it stationarily upon a previously formed seat, moving a part of the packer apparatus while the packer head is stationary on said seat, maintaining a circulation in the apparatus about the packer, and bailing from below the packer.

8. A method for making production tests in drilled wells before permanently sealing the well which consists in lowering a packer into the well to engage a previously formed seat, maintaining a circulation of clean water down through the packer and up through the lower portion of the well and into the packer to wash mud from the well wall without scouring the wall of the well above the packer, and rotating an outer part of the packer.

9. A method for making production tests in drilled wells before permanently sealing the well which consists in lowering a packer apparatus into the well to engage a previously formed seat, maintaining a circulation of clean water down through the packer apparatus and up through the lower portion of the well and into the packer apparatus, and rotating an outer part independently of the seated part of the packer apparatus.

10. In well drilling process, lowering a removable packer into a well to engage a previously formed seat to seal the well, maintaining circulation above the seated packer and maintaining motion on the means used for lowering the packer above the packer while the packer is stationary on its seat, thereby preventing said means from sticking and facilitating recovery of the apparatus, and drawing fluid from below the packer to the surface.

11. In a well drilling process, sealing a drilled well by a removable packer apparatus and maintaining a circulation in and out of the apparatus after the packer is placed upon a seat therefor in the well, and constantly moving parts of the apparatus to prevent sticking.

In testimony whereof I have signed my name to this specification.

GEORGE A. MACREADY.

Notes.

In drilling an oil well the measures passed through are necessarily divided into three groups or divisions. Each one of these divisions requires a specific treatment at the hands of the driller.

The first division is composed of drift or the loose surface accumulations from the surrounding rocks; the second embraces the immediately underlying series of stratified rocks to the depth at which they contain water; and the third, the remainder of the well, including the oil sands at the bottom. The walls of the third division are generally self-supporting, remaining just as the drill leaves them, and this division, when the well is completed, is the only one where the rocky walls are bare.

The first division, owing to the loose and crumbling material of which it is composed, requires some mechanical device to prevent it from slipping or caving into the hole as it is drilled. Here the "conductor" is used. A "conductor" may be simply a long box, without ends, made by spiking together four planks 2″ thick by 10″ wide—a "wooden conductor;" or it may be "drive pipe," composed of a number of cast-iron cylinders joined together and driven through the deposit; or it may be what is now more generally used, wrought-iron "surface casing," put in in a somewhat similar manner.

The "wooden conductor" can only be economically used where the surface deposit is of inconsiderable depth, as a pit must be sunk to the rock before it can be put in place. After the rock has been laid bare by the pick and shovel, the "conductor" is securely set between it and the derrick floor, the drill is let down to the rock through the conductor and the work of boring commences.

Where it is suspected that the floor of the drift lies too deep to be reached by digging, cast-iron "drive pipe" is used. This pipe is cast in sections about 9′ long. A space of 4″ at each end is carefully turned in a lathe to a certain gauge, and the end is cut smoothly at right angles to the axis of the pipe, so that the joints will stand perpendicularly one upon the other. A joint of pipe is placed on end in the centre of the derrick between two "guides," which have been temporarily erected for the purpose of driving it. A heavy "mall" working between these

guides is raised and dropped upon the pipe, slowly forcing it into the ground, precisely as piles are driven for docks, bridges, &c. When the top of a joint has been driven to the level of the derrick floor a band of wrought iron, made to fit the turned ends of the pipe, and heated red-hot, is quickly slipped upon the end of the driven pipe and another joint at once set up. The contraction of this band in cooling holds the two joints firmly together, and the driving process then goes on. In this way joint after joint is added and driven until solid rock is reached. As many as 23 joints have been used in a well. Great care is required when so long a "string of pipe" is driven to keep it straight and perpendicular, a broken band, or a large boulder encountered may cause the pipe to so far deviate from the perpendicular as to necessitate the abandonment of the well. To avoid this the pipe should be frequently cleaned out by the drill while being driven.

The more common method now employed in driving the well shafts through these thick accumulations of loose materials is to use heavy wrought-iron casing, made expressly for the purpose and armed with a hardened collar or "shoe" at the bottom. This casing is made in joints about 20′ in length, which screw together in wrought-iron "thimbles," the same as do ordinary gas pipes. The tube being thin and light, as compared with cast-iron drive pipe, cannot be so forcibly driven, but is worked down carefully by drilling a hole the full size of its inside diameter, and always keeping this hole open some feet in advance of the bottom of the pipe. In the old filled up valley of the Tunanguant, at Tarport, M'Kean Co., Pa., from 200′ to 300′ of this casing is required in each well.

Wells are spoken of indiscriminately as "small holes" or "wet holes" on the one hand, and as "cased holes" or "dry holes" on the other. A "small hole" must necessarily be a "wet" one, for there is no room to case off the water while drilling; and a "cased hole" must necessarily be a "dry" one, if the casing accomplishes the purpose for which it is used.

If now a well is to be drilled "wet," that is, if no effort is to be made to shut off the water which comes into it from the second division mentioned above, to keep it from following the drill down to the oil rocks, then this "conductor" of which we

have been speaking, whether of wood, cast-iron or casing, needs only to be 6″ in diameter, inside measurement. But if the well is to be drilled "dry" an 8″ conductor must be used, as will be seen further on.

In the first case, (for a wet well,) after the conductor is in place, a plain 5½″ hole is drilled all the way to the oil rocks; the water, meantime, nearly filling the well, or perhaps overflowing at the top of the conductor.

In the latter case, (for a dry hole,) an 8″ hole is to be drilled from the bottom of the conductor to a point below the water veins. When this is done, a 5⅝″ casing (inside diameter) is inserted, with a device on the bottom so arranged that it will form a water tight joint between the casing and wall of the well. A 5½″ hole is then continued down to the oil rocks from the inside of this last "string of casing." If the casing has been inserted to the proper depth and no water is encountered below it, the sand pump will soon exhaust the water in the process of drilling, and the well be perfectly dry. But if lower veins of water are struck, the casing must be drawn, the hole reamed out to a greater depth, and the casing continued down below them. After the water is exhausted, a few pails full are poured in, as circumstances demand, to moisten the drillings and furnish fluid for the sand-pump.

Comparing now the two wells when completed and ready for the pump, we find them both of the same size, 5½″ in diameter. One has simply a conductor through the upper division, all the stratified rocks being bare, is full of water, and has probably shown but very little indication of oil. The other has a conductor through the upper division, casing inside of this to the bottom of the middle division, and is dry—or at least was dry until the striking of the oil sand, when it immediately filled up several hundred feet with oil, or perhaps flowed.

The "dry" well is ready at once for the introduction of the pump tube; the "wet" one must be cased before it is tubed. The casing used for this purpose ("small casing,") is of 3¼″ inside diameter. A "water packer" or "seed bag" is attached to its lower end, which effectually closes the annular space between the outside of the casing and wall of the well. This "small casing," of course, must extend down to the bottom of

ond division, the same as the large casing does in the 'ell, for it has precisely the same duty to perform, the ..g off of the water in the upper rocks from the well shaft.

The well is now tubed with the ordinary 2" "tubing," having a "working barrel" or pump chamber at the bottom, which is placed at or near the point where the oil enters.

Inside of the "tubing" are inserted the "sucker rods," which are connected in the derrick to the "walking beam," and operate the pump valves below.

Upon starting the pump the "water packer" prevents any of the fluid outside of the casing from entering the well, and the water inside of the casing and in the uncased portion of the well is soon pumped out and the well is said to be "exhausted." As the well exhausts, the oil, which has been held back in the rock by the pressure of the heavy column of water above it, gradually forces its way into the well and is raised by the pump to the surface, unless it has a sufficient force of gas to flow of its own accord afterwards.

Further and detailed information on these and other points will be published in the Report of Progress, I.I.I., 1877.

400

CHAPTER V.

PITHOLE.

Records of Wells at Pithole City and vicinity, Cornplanter township, Venango County, drilled on the M'Kinney, Morey, Holmden, Rooker, Ball, Hyner, Babbitt, Reynolds and Dawson Farms.

These Pithole wells were drilled in 1865 and 1866, before the introduction of "dry casing" and before the ordinary 3¼ inch casing had come into general use. The larger part of them, therefore, were tested in the primitive way with a common flax-seed bag on the tubing.

Authority, (unless otherwise stated,) Mr. Samuel Minor, of Titusville, to whose large experience in oil operations and wise forethought in preserving every record obtained, in a book kept especially for the purpose, we are indebted for much valuable information in connection with these old wells.

GROUP 1.

M'KINNEY FARM.

(15 Wells.)

860. *Well No. 1, Lease No. 10.*

Well mouth above ocean in feet.................................

? (Interval unknown)........................	120	to	120	=
1st SS. (First Sandstone) estimated....	12	"	132	=
?..	225	"	357	=
2d SS., estimated	22	"	379	=
?..	65	"	444	=
3d SS., estimated........................	18	"	462	=
?..	137	"	599	=
4th SS....................................	21	"	620	=

401

Wet hole. Seed bag at 372′ not effectual, but at 490′ effectual. No salt water.

861. *Well No. 2. Lease No. 10.*

December, 1865.

Authority, H. M. Haskell.

Well mouth above ocean in feet					1336
? (Interval unknown)	115	to	115	=	1221
1st SS. (First Sandstone)	12	"	127	=	1209
?	235	"	362	=	974
2d SS	22	"	384	=	952
?	56	"	440	=	896
3d SS	17	"	457	=	879
?	38	"	495	=	841
Stray	8	"	503	=	833
?	102	"	605	=	731
4th SS.	20	"	635	=	701

Wet hole. Seed-bagged on tubing at 500′. Production, 28 barrels per day.

In July, 1866, the well was cased at 500′, with $3\frac{1}{4}''$ casing, and the production immediately increased to 70 barrels per day. In March of the following year it was still doing about 60 barrels.

862. *Well No. 17.*

Well mouth above ocean in feet					
Conductor	8 feet.				
Slate	92	to	100	=	
1st SS.	5	"	105	=	
?	260	"	365	=	
2d SS	12	"	377	=	
?	88	"	465	=	
3d SS., 18 inch crevice	12	"	477	=	
?	125	"	602	=	
4th SS, 8 inch crevice	17	"	619	=	
? pocket,	1	"	620	=	

Wet hole. Seed bags at 365′ and 465′. This well was located on east bank of Pithole creek.

863. *Well No. 29 (Old No. 6).*

Well mouth above ocean in feet					
?	375	to	375	=	
2d SS	26	"	401	=	
?	55	"	456	=	
3d SS., A.	21	"	477	=	

Slate	74	to	800	=
Red rock	15	"	815	=
Slate	79	"	894	=
Red rock	20	"	914	=

Wet hole. Unproductive. Water at 13′, 37′, 5.. 95′, 400′ and 738′. Gas at 248′, 270′, 485′, 630′ and 800′.

1041. *Experimental Well, No.* 1.

Cotter farm, on Brokenstraw creek, Pittsfield township, Warren county, 2 miles above Garland. Authority, C. W. Hare, the present owner.

Well mouth above ocean in feet				
Conductor	13	to	13	=
Slate, blue and gritty	6	"	19	=
SS. (Sandstone) grey	2	"	21	=
Slate	11	"	32	=
SS	2	"	34	=
Slate	49	"	83	=
Shale	30	"	113	=
SS., white and flinty	40	"	153	=
Soapstone	54	"	207	=
Slate, gritty and mixed with quartz	18	"	225	=
Red rock	4	"	229	=
Soapstone	5	"	234	=
Slate, with thin white sand shell	16	"	250	=
Soapstone	43	"	293	=
SS., quartz, thick oil and gas	2	"	295	=
Soapstone oil show	35	"	330	=
SS., (crevice)	2	"	332	=
Soapstone, show of oil and soot	20	"	352	=
Slate	10	"	362	=
Soapstone	14	"	376	=
SS	4	"	380	=
? (Interval unknown)	240	"	620	=
Slate, hard	10	"	630	=
SS	5	"	635	=
Soapstone and slate	97	"	732	=
3d SS	7	"	739	=
Slate, soft and soapy	8	"	747	=

Wet hole. Seed bagged at 116′. Tested at 634′, and again at 747′. Unproductive.

Another well was put down on this farm of which no log can be found.

[This other well referred to was on an island in Brokenstraw creek, and I was informed by Mr. John Jones, lessee of the farm, who appeared to be perfectly familiar with the history

of these wells, that about 200′ of drive pipe had to be driven in the island well to reach the bottom of the drift; that the well was drilled 1,000′ and then tested for two weeks. Failing to produce oil it was sunk 500′ deeper, and again tested with like results. On the last test, which was continued for 3 weeks, it showed no oil or gas but pumped about 75 barrels per day of very salt water. 1,500 feet at that time (about 1866) was a very unusual depth for a well, and it is a great pity that the record is lost. It would have given us some idea of the measures for at least 1,100′ below the horizon of the Venango oil group.—J. F. C.]

1042. "*Porkey Run*" *Well.*

1877.

S. Q. Brown farm; tract 87, Oil Creek township, Crawford county, 3 miles north-east of Titusville. Authority, Wm. F. Newton, lessee.

Well mouth above ocean in feet				
Conductor (wood, 25; sheet iron, 39;)	39	to	39	=
SS. (Sandstone) yellow	20	"	59	=
Slate, soft	15	"	74	=
Blue mud, running in well	15	"	89	=
Slate	101	"	190	=
1st SS	42	"	232	=
Slate, soft soapstone and red rock	184	"	416	=
2d SS., grey	22	"	438	=
Slate	20	"	458	=
Sand shells, hard and grey, no pebble	12	"	470	=
Slate, soft, no rod	80	"	550	=

The casing had to be put in at 103′ to shut off the mud which was freely running into the well, making it almost impossible to drill. Water came in below this point, and consequently the well was drilled wet. There was a red band about 6′ thick in the lower part of the slate immediately above the 1st SS.

Unproductive.

special specimens, yet *the records are intended to indicate the quality of the strata as shown by all the facts obtained at the wells while they were being drilled*, and consequently they may not always give a *precise description* of the particular specimen referred to.

§ 407. *Records written out from an examination of specimens* have been productive of an abundance of error, when unaccompanied by explanatory notes. Specimens do not always correctly represent the character of the rock's drilled through. A great deal depends upon the manner of washing and drying them. A series of sand-shells and argillaceous shale may be so ground up together by the drill that a thorough washing will leave nothing but sand. Frequently all traces of the soft red shales are thus entirely lost.

A small percentage of pebbles in an argillaceous or slaty matrix, may be washed and manipulated so as to present a very good pebble specimen.

A muddy sand may be washed so that it can scarcely be distinguished from a pure sand.

The natural color of a specimen may be entirely changed by oxydation of the small particles of metal worn from the tools, especially if the hole contains salt water and the material is not quickly dried.

Careless sand-pumping while in a hard sand may leave the bottom of the hole full of drillings to be ground over and over, and they then come up as fine as flour, and appear more like clay than sand.

Specimens also change very perceptibly in color by age, some bleaching in the light, others growing darker.

§ 408. *A well-record should be made at the well*, and nowhere else. There a person can see the sand-pumpings as they come up; examine the tools, which show unmistakably the character of the rock they have been working upon, by being either sharp or dull, scratched or polished; and converse with the drillers, who alone can tell at what point a change of rock occurs.

A record thus made should never be altered, even if the

descriptions given do not always exactly fit the specimens preserved.

§ 409. *How specimens should be collected.*—When a well cannot be visited by the person who wishes to study its record, a duplicate set of sand-pumpings should be kept by the drillers. It can easily be done in this way:

Dump the sand-pump into a pail; let the sediment settle; pour off the top; take a handful of the sediment and dry it immediately; then wash out an equal quantity and dry that. Put them in small paper bags and mark plainly the depth from which they came, and the thickness of rock they represent.

It is also a good plan to put on the date.

From specimens thus kept a very satisfactory study of the character of the measures drilled through could be made at any time.

cally engaged in the past, and are still employed in the deposition and building up of this class of rocks.

§ 430. *Sedimentary rocks* are defined by Lyell, as those which "are formed from materials thrown down from a state of suspension or solution in water."

This definition, at first sight, seems hardly broad enough to cover the ponderous mechanical sediments of conglomerate and sandstone composing the oil sands. But a second thought will vindicate its correctness, for even the largest pebble of the conglomerate must have been, temporarily at least, held in suspension by the energy of the transporting current as it was swept along rolling or ricochetting near the bottom.

Sea-beaches of sand and gravel which were thrown up along shore by waves and winds, high above ordinary tide level, belong also as truly to the sedimentary series when sunken and covered with other stratified deposits as do the accumulations of finer materials at a distance from the shore—which have been in a more literal sense, "held in a state of suspension in water."

§ 431. *If then the oil sands are of sedimentary origin*, it therefore follows that they could only have been laid down in oceans, lakes, or rivers, beneath the water level, or at or near its surface.

The forces employed in their construction could only have been those prevailing through aqueous conditions, and they are the same, and no others, that are possessed by water to-day, to wit: The buoyancy of the fluid, the transporting capacity of swift currents and the tremendous energy of rolling waves and dashing breakers. These forces, in connection with probable terrene oscillations causing alterations in relative levels of land and water, are sufficient to account for all the phenomena discovered in studying the structure of the sedimentary strata.

§ 432. *What the component materials of the oil group are*, may readily be ascertained by an inspection of the contents of sand-pumps, coming up from thousands of drill-holes, scattered throughout the oil district, and by an examination of the exposed portion of the out cropping oil

measures and the coal rocks above them, as seen in northwestern Pennsylvania—for both masses appear to be generically the same, and have evidently been deposited under similar conditions.

The materials vary from coarse conglomerates containing quartz pebbles occasionally two inches in diameter, through all grades of conglomerates, down to pebble-sand, sandstone, sandy-shale, slate, and the most finally levigated mud-rock or "soapstone" of the driller.

§ 433. *With such forces in action* as are enumerated above, varying in energy abnormally, with winds, and tides, and storms; affected by changes of levels, intensifying their powers at one time in this place, at another time in that, and with such heterogeneous materials to work upon, as the resultant strata indicate, we could only expect to find our oil-sands and their associates, (as indeed we do find them,) a variable mass of pebble, sand and shale beds, laid down locally with great irregularity and disorder, within the areas most sensibly affected by these changing conditions.

§ 434. *Water as a vehicle of transportation* for substances of greater gravity than itself, is strong or weak in proportion to the velocity with which it moves. It follows, then, that *the character of the sediment laid down is an index of the strength of the current depositing it.*

The oil-sands are frequently massive conglomerates, made up of the coarsest materials to be found in the formation to which they belong; the influence is unavoidable, therefore, that they owe their origin to the action of the strongest depositing currents prevailing at the period of their deposition. There are but three classes of currents that may be presumed to possess the adequate requisites for the performance of this kind of work, *river currents, deep-sea currents and shore currents.* Let us see which one of these has left the recognizable marks of its paternity upon the rocks in question.

Fluviatile Currents.

§ 435. In attempting to refer these sandy deposits to fluviatile currents, many objections present themselves, al-

requisition; and finally the gas pressure in the barrel becomes so weak that a vent hole must be made to admit atmospheric pressure before the barrel can be completely emptied even by the pump.

§ 476. *The flooding of an oil district is generally viewed as a great calamity*, yet it may be questioned whether a larger amount of oil can not be drawn from the rocks in that way than by any other, for it is certain that *all* the oil cannot be drawn from the reservoir without the admission of something to take its place.

If one company owned all the wells drawing upon a pool, and had accurate records of the depths and characteristics of the oil producing stratum in each well, it is quite possible that some system might be devised by which water could be let down through certain shafts, and the oil forced towards certain other shafts where the pumps were kept in motion, and thus the rocks be completely voided of oil and left full of water. As it is however, no systematized plan of action can be adopted. The careless handling of one well, by which water is let down to the oil rock, may spoil several others belonging to different parties. A clashing of interests at once arises and is likely to result in disaster to the whole district.

§ 477. *The early operators on Oil creek* knew nothing about "*casing*." Wells were drilled "*wet*" no effort being made to shut out the surface water; consequently when oil was struck, it met a static pressure of water corresponding to the depth of the well. In new and shallow territory the pressure in the rock was sufficient to hold the water in check and prevent it from entering the oil sand and sometimes it had force enough to eject a column of water from the hole and flow on steadily for some time in defiance of it. But as developments progressed and oil currents began to be diverted towards numerous outlets through pumping and flowing wells, it often very naturally occurred where the circumstances favored it, that this column of water in a well just completed would force itself into the oil sand, driving the oil before it, and quickly flood a neighboring well. When the new well was tubed and seed-bagged it frequently

took several days pumping to relieve the sandrock of the water thus forced into it, and regain the oil. These troubles increased more and more as territory became older and the pressure of gas in the rock decreased through the removal of large bodies of oil. At that time the seed-bag which prevented the surface water from passing down, was affixed to the tubing, and any difficulty in the working chamber or valves which necessitated the withdrawal of the tubing, (and these contingencies occurred frequently,) involved the letting in again of the surface waters upon the oil rock. Frequent repetitions of this operation finally brought ruin not only on the well itself but on others in the vicinity. In the abandonment of a well thus spoilt, or of one which had been drilled and proved unproductive, no care was taken to prevent the water from entering the oil rock. Indeed it seemed to be a satisfaction to those who had been unsuccessful in their ventures, to spoil if possible the good wells of the more fortunate. From these causes it happened that nearly all the farms along oil creek were very much injured by water before the true situation of affairs was rightly understood.

§ 478. *Small casing* ($3\frac{1}{4}''$) *was first introduced in 1865.* This held the seed bag on its lower end and extended down below the fresh water veins, so that the tubing could be inserted inside of it and withdrawn at pleasure without letting in the water (see Plate XIV). Many of the old wells were then cased—the abandoned holes were filled up or stopped with a wooden plug above the oil sand to prevent the further admission of water—large pumps were set in motion to exhaust the water and after great expenditures and persistent effort some tracts were partially reclaimed and certain wells yielded oil freely, for a time. But conflicting interests and a want of coöperation among the many well owners prevented systematic work, the flood consequently again became unmanageable, and large areas of old oil territory were finally abandoned.

§ 479. *The manner in which water invades and takes possession of the oil sands*, has created a great deal of discussion among well owners and others. Some producers

have imagined they so thoroughly understood the subject that they could go ahead and put down new wells or operate old ones in flooded territory, in such a way as to catch the oil driven before the water-wave and make a profitable business of it; but they have generally been convinced by experience if they persisted in their operations long enough, that success in this kind of oil producing might be attributed to chance quite as reasonably as to good judgment.

It is an easy thing to *theorize* as to how the water currents *might* conduct themselves, but quite another to show precisely how they *do* act, for we can only have, at best, a very imperfect knowledge of the constitution of the sand-rock, and therefore cannot foresee all the contingencies dependent upon details of structure, which may arise to thwart the most shrewd and judicious calculations.

§ 480. *In judging of the probable effects of the introduction of water* into any particular oil district several things are to be considered.

(1) *The time of flooding*—whether early in the progress of development, while yet a large percentage of oil remains unexhausted, or at a later period after the supply has suffered from long continued depletion. (2) *The structure of the rock*—whether regular and homogeneous throughout, or composed of fine sand interbedding connected and irregular layers of gravel, sometimes lying near the top and at others near the bottom. (3) *The shape of the area being flooded.* (4) The position of *the point at which water is admitted*, in relation to the location of the surrounding wells still pumping oil (5) *The height* (which governs the pressure) *of the column of water* obtaining admittance. (6) *The duration of the water supply.*

It will readily be seen that a *temporary flooding* in comparatively *fresh territory*, such as frequently occurred in early days along Oil creek from the drilling of new wells without casing or the overhauling of old ones where the seed bag was attached to the tubing in the primitive way, must necessarily be quite a different affair from one caused by a *permanent deluge* through unplugged and abandoned wells in *nearly exhausted territory.*

and to prevent it from attaining too great speed, it is checked by pressing the lever, *e*, backward so as to throw the friction pulley *w*, against a post, or a curved piece of sheet iron set behind it in proper position to act as a brake when the wheel is pressed against it.

The sand-pump line is coiled upon the shaft, *x*. It is a cable laid rope ⅝ of an inch in diameter, and passes direct from the shaft over the pulley, *ii*, and thence down inside of the derrick to the well mouth, where it is secured to the bail of the sand-pump.

Sand-pumps and bailers of several kinds are in use. The most common one is a plain cylinder of thin galvanized iron with a bail on top, and either a leather flap-valve or a metal stem-valve in the bottom. It is usually about 6′ long, but when large quantities of water or oil are to be dipped from the well, it may be lengthened to 15 or 20 feet. Stem-valve bailers are much esteemed on account of their convenience in discharging contents. The valve stem projects downward a few inches beyond the bottom of the cylinder. To empty the pump it is only necessary to let it rest on the bottom of the waste-trough, when the stem opens the valve and the sediment escapes. The flap-valve pumps are emptied through the top, by inverting them.

Other sand-pumps are made of wrought iron casing and in addition to the bottom valve they have a plunger attached to an iron rod which passes through a hole in a stirrup spanning the top of the case. The sand-pump line is secured to an eye in the top of this rod and the pump chamber hangs suspended from the bottom of it—held by the plunger, which cannot pass through the hole in the stirrup. When the pump stops at the bottom of the well, the slack of the rope allows the plunger and rod to settle down into the pump chamber; consequently on an upward movement the plunger and rod start first and travel the length of the cylinder drawing in the sediment from the bottom; but when the plunger reaches the stirrup the cylinder starts upward also, closing the lower valve and retaining the sediment thus drawn into it to be delivered at the well-mouth.

§ 523. *The bull-wheels, bb*, are driven by the "bull-

CHAPTER XXIX.

(Illustrated by Plates XIV, XIV bis, XV and XXXIX.)

Different methods of drilling and pumping oil wells from 1861 to 1878. Progressive improvements. Relative cost of wells, &c.

§ 546. *Every oil well shaft is naturally divisible into three sections: First*, unconsolidated deposits—surface clay and gravel. *Second*, stratified rocks containing more or less water—shales and sandstones. *Third*, stratified rocks seldom water bearing—slates, mud rocks, shales and sandstones, including the oil sands of the different districts.

The first division always requires a conductor-pipe or casing of some kind to prevent caving. It varies in thickness in different localities from four feet to four hundred feet, the deepest accumulations always being found in valleys.

The second division requires no support for the walls, but must be cased to prevent the water contained in it from following the drill down to the oil sand. Its thickness may be one hundred, or six or seven hundred feet, depending on location.

In the third division the bare rocks form the well-wall, and it is not an unusual occurrence to pierce a thickness of ten or fifteen hundred feet of these strata without encountering enough water to supply the ordinary demands of the sand-pump. In Watson's deep well at Titusville, 3300 feet feet of the wall was bare rock, but water had to be poured in at the top to moisten the drillings.

Therefore each of these divisions must be considered separately in describing the well shaft and its appurtenances.

§ 547. *On Plate XIV* the reader will find sectional drawings of three oil wells representing different periods and designed to show the improvements made in the style of drill-hole and also in its furniture since the year 1861.

As the horizontal and vertical scales of the drawings are the same, ($\frac{1}{20}$ of nature,) the sections necessarily show but a mere fraction of the total length of an ordinary well, for to thus fully represent one only 1500 feet deep, would require a roll of paper 75 feet long.

The "surface section" shows about 4 feet of the well shaft below the derrick floor, and 7 feet of the well fittings above it, and is intended mainly to explain the details above ground.

The "bottom of drive-pipe section" shows about 4½ feet of the well shaft at the junction of the superficial deposits with the bed-rock, being the termination of the *first* division mentioned at the head of this chapter.

The "seed-bag section" shows about 5½ feet at the junction of the water-bearing and non-water-bearing rocks, being the termination of the *second* division as aforesaid.

The "bottom section" shows about 10½ feet of the oil sand, being the termination of the *third* division and bottom of the well.

The artist's representations of shale, sandstone, &c., are merely illustrative, and not by any means typical.

§ 548. *The three cross sections of well mouths* drawn to natural scale (see Plate 14, bis.) will materially assist one in understanding the details of conductor, drive-pipe, casing, tubing, sucker-rods, &c., as seen in the wells on Plate XIV.

No. 1 belongs to the well of 1861, *No. 2* to the well of 1868, and *No. 3* to the well of 1878. As these drawings represent the actual dimensions of the drill holes and all the materials belonging to them that can be seen in cross sections of the well mouths, they present the facts in a very clear and comprehensible manner, and need no further comment.

Fig. No. 1.—Well of 1861.

§ 549. *The primitive style of drilling and tubing an oil well* is illustrated in Fig. No. 1, Plate XIV. It shows a simple wooden conductor* with a 4-inch "wet hole" continuing down below it to the oil sand, and a string of tubing having an old fashioned seed-bag attached to it.

By this method of drilling, as the hole was generally nearly filled with water from the gravel-beds, and kept so by it and accessions from lower water-courses, it was not possible to note exactly where the lowest water-vein was passed; consequently the point for seed-bagging became a matter of doubt, and frequently the tubing had to be drawn several times to change the position of the seed-bag, before the water could be effectually shut off.

It is desirable always to stop the water as near as possible to the bottom of the stratum where it enters the well, for if it be allowed to pass down the shaft below the impervious rocks immediately underlying its natural horizon, it may find access into some more porous stratum beneath it, and pass through into and flood adjoining wells which are seed-bagged in a higher geological plane.

§ 550. *In preparing to tube a "wet hole,"* the point at which the seed-bag is to be placed must first be decided upon. Suppose it to be 300 feet from the bottom. Then the tubing is carefully measured joint by joint, and 300 feet (less the length of the working-barrel, and whatever distance is to be left between it and the bottom of the well,†) is placed in a pile upon the derrick floor. The working-

* The conductor plank in Fig. 1, is shown by scale as one inch thick. It should have been two inches.

† Sometimes the working-barrel was put 20 or 30 feet, or even more, from the bottom of the well, on the theory that the pump worked more effectively when placed as near as possible to the point at which the oil was supposed to come in. But this resulted in many expensive accidents, for if the tubing chanced to part above, it would be ruined by so great a fall. To prevent this an anchor, or piece of perforated tubing of the proper length should be put below the working-barrel, reaching to within three inches of the bottom, and thus, while the tubing hangs suspended from the top, (which keeps it much straighter than if it rested on the bottom,) it cannot fall to its injury if a break occurs in it.

415

barrel is first put in the well and held by clamps fitting under the thimble; then a swivel attached to the tubing cable, which runs up over the crown-pulley and down to the bull-wheels, is screwed into a joint of tubing, and it is elevated and screwed fast to the working-barrel; the clamps are opened to allow the thimble to pass, and the tubing is lowered into the well until the upper thimble rests upon the clamps; the swivel is unscrewed and put into another joint, which is manipulated in the same manner, and thus the work of tubing goes on until the point for seed-bagging has been reached. Now a pause is made and a leather bag like a boot-leg, two or three feet long, and when expanded exactly fitting the well bore, is slipped over the tubing and securely fastened to it by wrapping its lower end with cord. The wrapping is put immediately under a thimble, to prevent the bag from slipping up as it goes into the well, for if the bag be a little too large, or a contracted spot occurs in the shaft, the tubing may have to be forced down occasionally by levers at the top. After the bottom has been tied, the bag is packed with common flaxseed, and a ring having the same diameter as the well bore is passed over it to make sure that it is of proper size. The top is then tied like the bottom, but not so securely (for it is designed to break loose here and turn, when the tubing is to be drawn out,) and it is lowered into the hole by adding the remainder of the tubing joint by joint, as before, until the amount required to place the seed-bag in the position designed has been put in, when the head-block is screwed up, the clamps are permanently secured beneath the thimble by inserting the safety-bolt, and the tubing is ready to receive the sucker-rods.

§ 551. *The sucker-rods are introduced* in a similar manner to the tubing; but as the tubing is full of water, which the rods must displace and cause to flow over at the top as they descend, they can frequently be inserted the first time by hand, without the assistance of pulley-rope or swivel. Indeed, when they are dry and somewhat crooked they require considerable downward pressure to overcome the buoyancy of water and friction against the tubing. After

416

the rods are in and connections with the walking-beam made, the well is left over night to allow the seed-bag time to moisten and swell so that it may fit sungly to the walls of the well.

§ 552. *When the pump is started*, it can draw its supply only from the well chamber below the seed-bag, if the latter is effective and accomplishes the purpose intended. Hence (provided there are no water veins below the seed-bag) the water is soon pumped out from the bottom of the well, the oil-rock is relieved from its pressure, and the oil and gas now meeting with no opposition, come into the chamber and pass up through the tubing as the water exhausts.

§ 553. *Very grave defects* were soon discovered in this method of managing oil wells. Ordinary wear and tear of machinery or accidental break-downs often made necessary the removal of the tubing before repairs could be made, and this could not be done without disturbing the seed-bag and again letting down the surface water in full force upon the oil-rock. In new wells and new territory this might be fraught with little damage; but in an old district, after large bodies of oil had been drawn from the sandrock, it often proved disastrous. Consequently some plan had to be devised whereby the tubing could be withdrawn at pleasure without disturbing the seed-bag, and the first one adopted was to shut the water off by inserting 3¼-inch casing, as will be described below.

Fig. No. 2.—Wells of 1868.

§ 554. No great changes were made in the style of drill hole or the methods of drilling between the years 1861 and 1868. All parts of the machinery and tools employed were made heavier and stronger, of course, for the shafts were larger and deeper, but the wells of 1868 were still drilled as before, through a simple drive pipe or conductor, the holes being full of water while drilling, and remaining so until the pumping machinery was put in motion.

Fig. 2 shows a cast iron drive pipe* instead of a wooden conductor, through which a plain 5½ inch hole was sunk to the oil rock.

§ 555. *To introduce the 3¼" inch casing* was the first step in preparing to tube a well of this date. On the bottom of it was affixed the seed-bag, and consequently the length of casing required depended upon the distance the base of the water bearing rocks lay below the suface. In some wells one hundred feet would suffice, in others three or four hundred were necessary. Sometimes an ordinary seed-bag was used, and sometimes a patent water-packer consisting of a heavy iron ring a quarter of an inch smaller than the size of the hole, supporting a leather cup similar to the leathers on the cup valve used in the pump barrel. The rim of the cup is thrown open and held against the walls of the well by static pressure as soon as the water below it commences to exhaust.

But as the casing was a *permanent fixture* intended to remain in place for years, or as long as the well lasted, many well owners preferred to put on both styles of seed-bags one above the other as shown in Fig. 2.

*The following note from Report II, page 136, may very properly be reprinted here:

"Where it is suspected that the floor of the drift lies too deep to be reached by digging, cast iron "drive-pipe" is used. This pipe is cast in sections about 9' long. A space of 4" at each end is carefully turned in a lathe to a certain gauge, and the end is cut smoothly at right angles to the axis of the pipe, so that the joints will stand perpendicularly one upon the other. A joint of pipe is placed on end in the center of the derrick between two "guides," which have been temporarily erected for the purpose of driving it. A heavy "mall" working between these guides is raised and dropped upon the pipe, slowly forcing it into the ground, precisely as piles are driven for docks, bridges, &c. When the top of a joint has been driven to the level of the derrick floor a band of wrought iron, made to fit the turned ends of the pipe, and heated red hot, is quickly slipped upon the end of the driven pipe and another joint at once set up. The contraction of this band in cooling holds the two joints firmly together, and the driving process then goes on. In this way joint after joint is added and driven until solid rock is reached. As many as 23 joints have been used in a well. Great care is required when so long a "string of pipe" is driven to keep it straight and perpendicular, a broken bank, or a large bowlder encountered may cause the pipe to so far deviate from the perpendicular as to necessitate the abandonment of the well. To avoid this the pipe should be frequently cleaned out by the drill while being driven.

The casing-head was screwed to the top of the casing and formed a substantial head block for the tubing to rest upon. It was very similar to the one shown in Fig. *a*, Plate XXXIX.

§ 556. *Tubing.*—The work of casing completed, the next step was to insert the tubing. As the inside diameter of casing was $3\frac{1}{4}$ inches, and the outside diameter of tubing thimbles or collars $2\frac{3}{4}$ inches, the latter moved freely inside of the former, and could be put in quickly, there being no delay for seed-bagging, and no measurements necessary. An anchor was put below the working-barrel, and the tubing added on until it struck bottom, when a mark was made on the tube projecting from the well mouth, and the whole string drawn up again to the first thimble. After taking off the first joint, another of proper length, with the casing flange attached to its top was substituted for it, so that when lowered again into the well the tubing would be suspended from the casing head, and the anchor swing just clear of the bottom.

§ 557. *Pumping.*—If the seed-bag proved effective, the space between tubing and casing was quickly relieved of water when the pump was put in motion, and as its surface lowered in the well a partial vacuum formed above it, as was plainly demonstrated by the force with which the air rushed into the well chamber on opening the stop cock at the casing-head. When the water surface drew down below the oil vein, a reaction occurred; the well chamber quickly filled with gas and oil, the former turbulently seeking an exit at the casing-head, while the latter was drawn into the pump barrel as the water at the bottom exhausted, and gradually filling the tubing from the bottem expelled the water at the top, and made its appearance at the delivery pipe in due time.

§ 558. *Water Pump.*—In situations where water was needed for boiler use, a $\frac{3}{4}$ inch pipe and pump were run down between the casing and well-wall into the water chamber above the seed-bag. Its little sucker-rod of $\frac{1}{4}$ inch pipe or of iron rods was attached by a clamp to the

polished rod * of the oil well, and thus by working constantly furnished all the water required.

§ 559. *Defects in these methods of managing wells.*—Although the well of 1868 was a great improvement over the well of 1861, still it did not meet all the requirements of the situation. In deep shafts the presence of water in the hole greatly retarded the speed of drilling, and it was realized that a column of water a thousand or fifteen hundred feet in height must have an injurious effect upon the oil rock. Experience proved also that many accidents were possible which necessitated the drawing of the casing before the wells could be put in running order; for the cased part being only 3¼ inches in diameter, and that below it 5½ inches, adequate fishing tools could not be introduced when any serious accident happened from dropping tubing, &c. And again, if the well needed to be cleaned out or sunk deeper only a 3¼ inch hole could be drilled, and that with tools necessarily so light that the work was slow and unsatisfactory. These and other considerations naturally led to the experiment of drilling through large casing, and this was found to be so great an improvement over the old plan that it soon entirely superseded it.

No. 3.—Wells of 1878.

§ 560. This well differs from the last described in many particulars. Its drive-pipe consists of an eight inch wrought

* The polished rod is a bar of cold rolled iron 12′ long and 1½″ in diameter, having on one end a box to fit the sucker-rod pins, and on the other a thread for a swivel. In conjunction with the adjuster, it affords a ready means for connecting the sucker-rods to the walking-beam without the delay of cutting the rods to the exact length required. The adjuster is attached by its bearing to the walking-beam, and by means of set screws can be clamped immovably to the polished rod at any point, when it becomes a cross head pivoted upon the walking-beam, and supporting and operating the sucker-rods in the well. After the sucker-rods are put in the tubing, and the working-valve rests upon the standing-box at the bottom, the upper joint of rods may project above the well mouth a few inches or three or four feet. The walking-beam is now put in position, and the polished rod is run up through the adjuster and screwed to the sucker-rods. Then by means of the sucker-rod rope and swivel on top of the polished rod, the whole string of rods is raised as much as is required to give the necessary play between the pump valves, when the polished rod is clamped in the adjuster, the swivel is detached and the well is ready to pump.

iron tube armed at the bottom with a steel shoe and driven to the rock as described in the previous chapter. The 8 inch jars, bit and reamer, mentioned among the drilling tools are employed while sinking this pipe. After it has been driven to bed rock the 8 inch hole is continued down to the base of the water bearing strata, one, two, or three hundred feet as the case may be, when drilling is suspended and another tube 5⅝ inches in diameter, (technically called "the casing,") is inserted. Before stopping to case, however, the bits are drawn down gradually to reduce the diameter of the hole from 8 inches to 5½ inches, thus forming a beveled shoulder for the casing to rest upon, into which the collar fitted to the bottom of the casing for that purpose, is ground and seated by revolving the casing a few times while it is resting on the bottom. This usually produces a water-tight joint, but if a little sand-pump sediment be thrown in between the casings it will settle at the bottom and make the joint still more secure.

After casing, the 8 inch jars and bits are laid aside for the regular 5½ inch tools, which pass freely through the casing and cut a hole of that diameter to the bottom of the well.

Quite frequently veins of water are encountered after a well is cased, and if it does not exhaust by sand-pumping, drilling is stopped, the casing drawn, the hole reamed out to 8 inches and more casing put in. In new territory where the depth of the water-bearing rocks is not known, this operation may have to be repeated several times. As wells are now drilled, a contractor is not allowed to continue his work unless he succeeds in effectually shutting off all water before striking the oil rock.

§ 561. *Deep "wet wells"* seldom give much show of oil either on tools or in the sand-pump while drilling, and it is only after they are tubed and exhausted of water that the oil makes its appearance. But in dry cased wells, the moment a vein of oil is tapped it gives notice of its presence and frequently flows out at the surface before the tools can be drawn. Thousands of dollars have been spent in testing hopelessly unproductive wells that were drilled "wet," be-

421

cause it could not be known until they were tubed and tested, whether they contained oil or not. But with dry casing the owner knows when the well is finished whether it will be productive or not, and all the testing required can be done with a sand-pump. Thus a considerable item of expense is saved to the operator who is so unfortunate as to get a genuine "dry hole" or "duster."

§562. *The average cost of drilling cased wells*, (especially if we take into account the reduced liability to accidents from tool sticking, &c.,) is probably but little if any greater than it would be if they were drilled wet. The additional expense of boring an 8 inch hole two or three hundred feet, and the increased cost for large casing, is often fully offset by the time and money saved in more speedily drilling the remainder of the well. Quite an item in the cost of fuel is also sometimes realized, for a vein of gas may be struck several hundred feet from the bottom of the well, which will fire the boiler until the work is finished.*

§ 563. *Some of the obvious advantages* which a cased well has over the well of 1868 are these:

Fishing operations can be successfully prosecuted, for the bore is of the same size all the way down.

A deep hole, five and a half inches in diameter, can be carried on down without letting the surface water in.

Torpedoes can be put in safely and with better efect.

The water-packer can be introduced on the tubing at

* When gas is obtained from the upper rocks in sufficient quantity to furnish fuel for the boiler during the remainder of the drilling, it is conveyed to the boiler through a two-inch pipe, connected with the casing beneath the derrick floor, as seen in Fig. 3. Just before this gas-pipe enters the fire-box, a quarter-inch steam-pipe from the boiler passes into it through a tee, and terminates in a quarter-inch elbow, which is thus held in the center of the two-inch pipe. Another piece of quarter-inch pipe, with the opening in one end reduced, to less than an eighth of an inch, is then screwed into the elbow with the reduced end pointing toward the fire-box. When steam is let into the small pipe, it vents in the center of the gas-pipe and forms an "injector," which forces a current of gas and steam into the fire-box, while the draft occasioned by it in the lead-pipe, draws in the gas from the well, although the well mouth is entirely open, and also prevents all danger from "back suction." Without an "injector" the burning gas is liable to run back through the delivery pipe to the well mouth, where it will explode and set the rig on fire.

any point desired, either to confine the oil and gas and induce them to flow, or simply to prevent the seepings of salt water which sometimes come in below the casing in quantities so small as to be scarcely noticed while drilling, from reaching the bottom of the well, to the detriment of its oil-production.

Geological Sections.—Plate XV.

§ 564. Placing this plate by the side of Plate XIV, we see that the geological structure of the areas operated upon at different periods has largely directed and influenced improvements in the methods of drilling and the appliances for pumping oil wells. The system of operating which met the requirements of the situation in 1861, would have been worse than useless in the deep territory of 1878. The problem forced upon the oil producers has been how to accomplish a greater depth of drilling without increasing the cost of his well; and it has been worked out with such success by the thousands of energetic, inventive minds, engaged in the business, that the average cost to-day of a well 1500 feet deep is less than one of 500 feet was in 1861, and our present wells are also much more fully equipped, and with a better class of machinery.

§ 565. *A little profile section* at the bottom of Plate XV shows that the additional depth of drilling was not required alone on account of a greater altitude of areas drilled upon, but was due mainly to the southwesterly dip of the oil sands.

§ 566. *Geographical positions of the vertical sections.*—Section No. 1 is typical of the geological structure on Oil creek, near the celebrated Noble well; No. 2, of the higher table lands at Pleasantville; and No. 3 is made from the record of Sutton well, No. 4, near Petrolia, in Butler county.

The distance from No. 1 to No. 3 is about 36 miles. The well mouth of No. 3 is only 324 feet *higher* above ocean level than the well mouth of No. 1; but the oil sand of No. 3 is 846 feet *lower* than the oil sand of No. 1. Therefore

over 70 per cent. of the additional depth of drilling is occasioned by the dip of the oil sand.

Page Plate No. XXXIX.

§ 567. *Explanation of Figures*—Illustrating some of the details of oil-well machinery mentioned in the preceding pages:

	Cost.
a, Casing head for 5⅝ in. casing,	$7 65
b, Sand-pump pulley,	3 25
c, Working-barrel, extra heavy brass, 1¾″ dia. (for 2″ tubing), 5 feet long,	21 75
d, Upper valve for 1¾ in. chamber,	7 50
e, Lower valve for 1¾ in. chamber,	4 00
f, Water-pump and valves, 1 in. dia.,	14 75
g, Rivet catcher,	2 35
h, Bull-rope couplings, 3 holes, for 1¼″ rope,	1 33
Bull-rope couplings, 4 holes, for 2¼″ rope,	1 90
i, Armor's water packer,	21 35
k, Jars. See Chapt. XXVIII.	

The cuts and price-list are taken from catalogue of Jarecki Manufacturing company, dated 1876. It will be seen that some of these prices vary considerably from those given in "cost of well at Bradford," in 1878, when well fittings were down to their lowest figures.

§ 568. *The rivet-catcher* is a perforated cup, to be attached to the valve stem above the valve, and is designed to catch broken rivets, in case any should work out of the sucker-rod joints, and prevent them falling upon the working valve, where they would quickly wedge and score the working-barrel—spoiling it, perhaps, for future use, before the pumper was aware that anything was wrong.

§ 569. *The water-packer* only came into general use about the year 1875. It is one of the several improvements upon the old-fashioned seed-bag, made possible by and naturally following the use of dry casing in wells. Its design is to prevent any water that may seep into a well below the casing, from gaining access to the oil sand, and to stop the ascent of gas on the outside of the tubing. The oil and gas are thus confined in the well chamber, below the water-packer, and the diameter of the tube through which they

must pass to reach the surface, is reduced from 5¼ inches to 2 inches. As a result, many wells flow when treated in this way, that otherwise would require pumping.

A number of patented packers are in use. The one shown above is simple in construction and effective in operation. It is made of malleable iron and rubber. The top piece, 1, is connected with the bottom, 3, by a slip-joint, the upper tube, 1, passing through the rubber band, 2, and sliding inside of the lower tube, 3. Fig. *i* shows the packer open; to close it as in the well, the top is shoved down so that the flange of 1, rests upon the rubber band, 2. This forces the cone into the rubber band and compresses it against the well walls, and causes the lower part of 1 to project below 3, and on this projecting end of 1 is affixed the working-barrel, when one is to be used. To 1 is attached the 2″ tubing reaching up to the well mouth, and to 3, the "anchor" extending down to the bottom of the well. The length of "anchor" decides, of course, the point at which the well will be packed, for when it strikes bottom the weight of tubing above the packer telescopes the slip-joint, expands the rubber and shuts off all communication between the annular space outside of the tubing above the packer and the well chamber below it.

§ 570. *The "anchor" is* made of a piece of perforated 3¼″ casing, say 6′ long (it must be long enough to receive the working barrel.) This is screwed on to 3. A reducer is inserted in the bottom of the casing, and a proper amount of 2″ tubing is added to make the anchor of the requisite length.

§ 571. "*Packed Wells.*"—A large number of wells in the Bradford district are "packed" in this manner at the top of the oil sand, and they flow periodically several times a day without requiring any attention, for months at a time, except to watch the receiving tank which quickly tells when a falling off in production occurs and an "overhauling" is necessary.

Cost of an Oil Well in 1878. Bradford District.

§ 572. An extensive oil producer in Bradford, McKean

county, gives the following figures in detail to represent the actual cost of drilling and equiping an oil well in December, 1878. But it should be understood that this was a period when both labor and well machinery were at their lowest values:

Carpenter's rig, complete,	$350
Belt, bull-rope, engine "telegraph," water pipes, steam pipes and fittings to connect boiler and engine,	100
Boiler, (20-horse power,) and engine, (15-horse power,) on ground,	750
Contract for drilling, contractor to furnish fuel, tools, cable, sand, pump line, &c., at 65 cents per foot, say 1500′,	975
Casing say 300′, at 80 cents per foot,	240
Tubing, say 1600′, at 20 cents per foot,	320
Torpedo, (almost universally used before tubing,)	100
Packer,	25
Working barrel,	8
Casing head,	3
Tees and elbows to make tank connections,	5
One twenty-five barrel tank,	25
One two hundred and fifty barrel tank,	110
Tank house,	25
Expense of tubing and packing well,	20
Expense for hauling tubing, material, &c., say,	50
Total cost of well, flowing,	$3,106

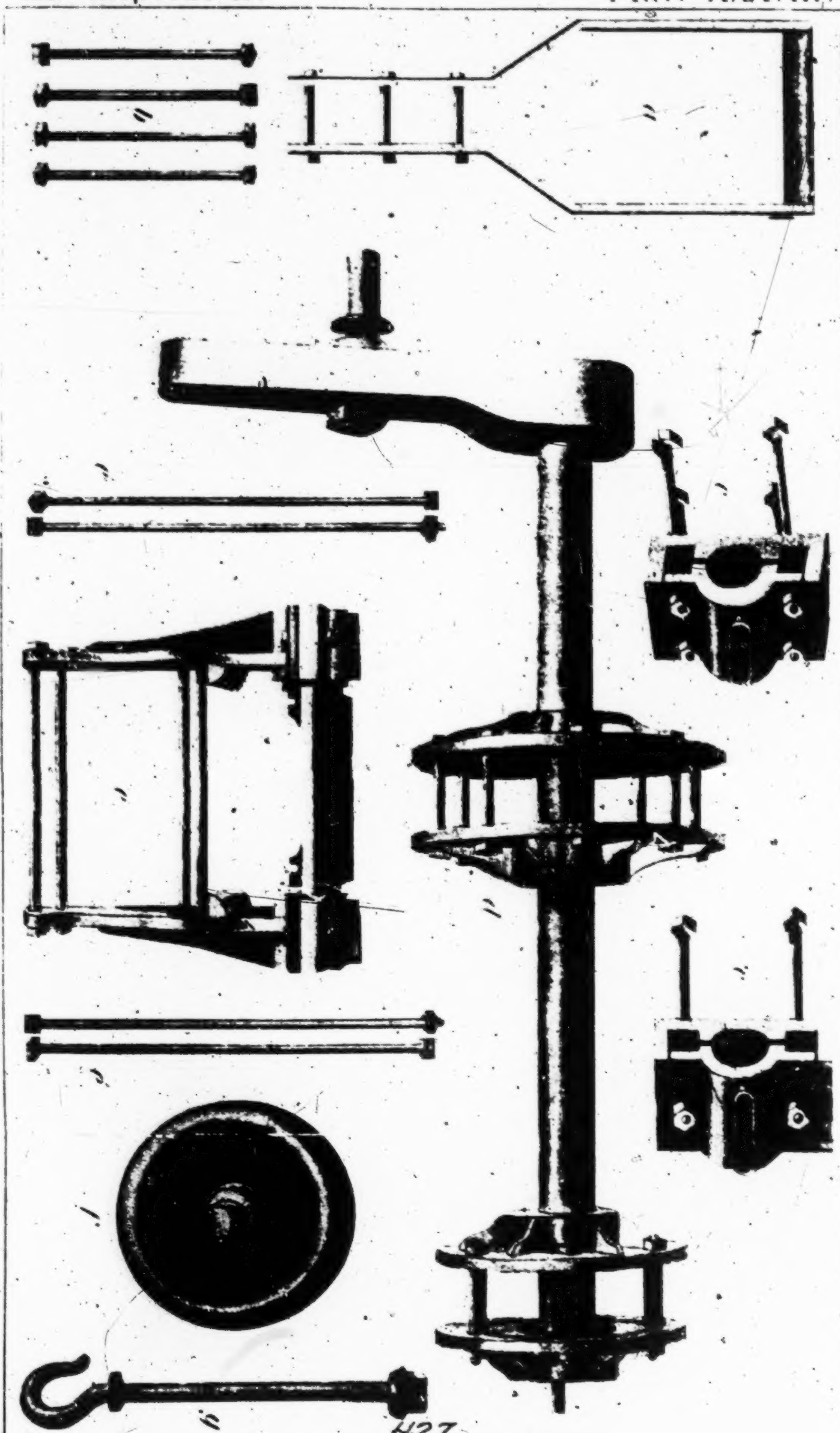
In the above well no "drive pipe" was used, a short wooden conductor set by the rig builder being all that was required. In localities where from 100′ to 280′ of drive pipe casing, costing $1 80 per foot is required, the cost of a well is increased accordingly.

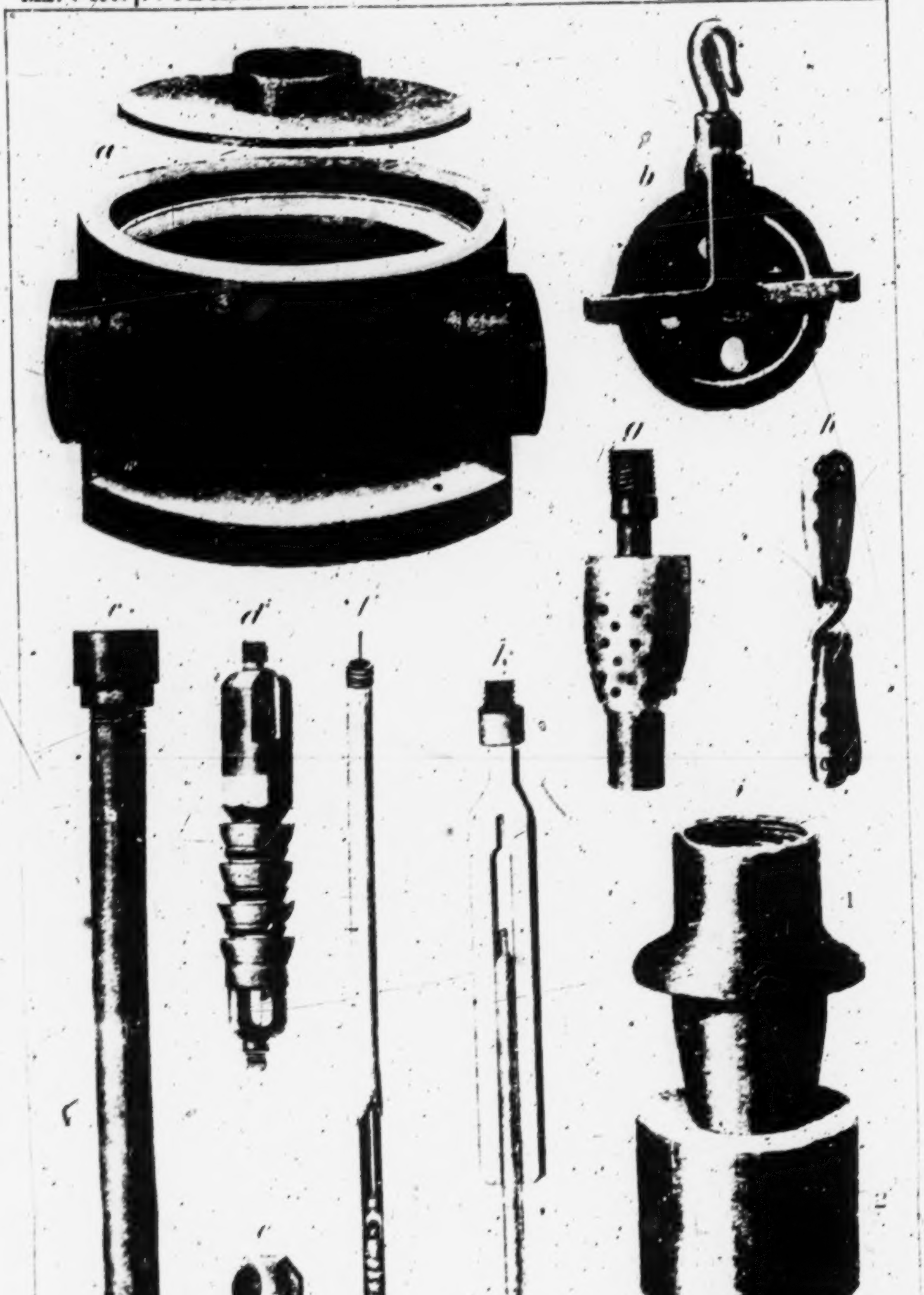
§ 573. If the well is to be pumped the following items are to be added:

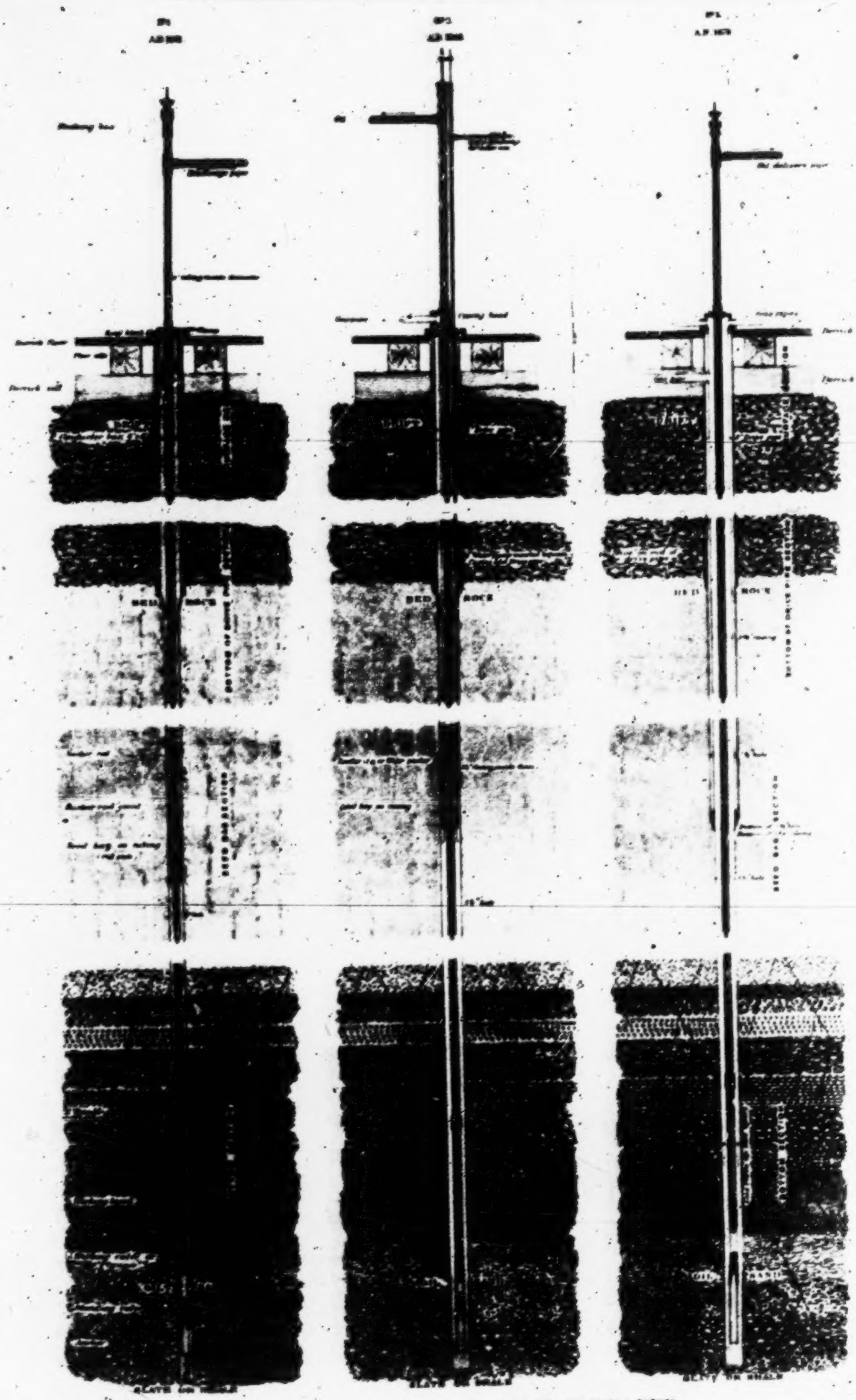
1500 feet of sucker rods @5½ cents,	$82 50
Valves for working barrel,	7 00
Polished rod,	2 50
Stuffing box,	1 50
Adjuster,	5 00
Tees and elbows, &c., say,	2 00
	$100 50

§ 574. The necessary tools and implements for handling the tubing and sucker-rods, are—

Large pulley block,	$11 00
Tubing elevators,	9 00
Three pairs of tubing tongs,	10 00







SECOND GEOLOGICAL SURVEY
OF
PENNSYLVANIA

SECTIONAL DRAWINGS OF

THREE OIL WE

SHOWING SUCCESSIVE VARIATIONS IN ST

DRILL-HOLE DRIVE-PIPE SEED BAG, TUBING CASING

47TH CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { Mis. Doc. 42, Part 10.

DEPARTMENT OF THE INTERIOR.

CENSUS OFFICE.

FRANCIS A. WALKER, Superintendent, Appointed April 1, 1879; resigned November 3, 1881.

CHAS. W. SEATON, Superintendent, Appointed November 4, 1881.

PRODUCTION, TECHNOLOGY, AND USES OF PETROLEUM AND ITS PRODUCTS.

BY

S. F. PECKHAM.

THE MANUFACTURE OF COKE.

BY

JOSEPH D. WEEKS.

BUILDING STONES OF THE UNITED STATES,

AND

STATISTICS OF THE QUARRY INDUSTRY FOR 1880.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

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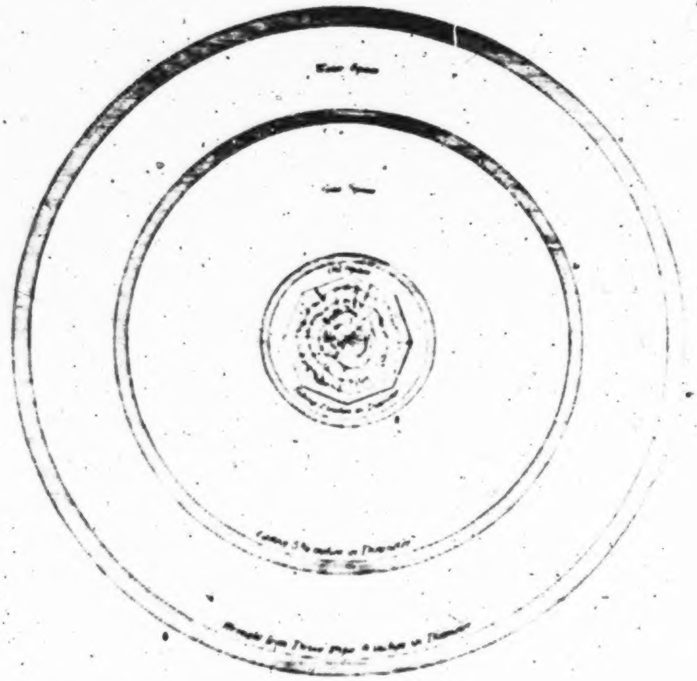
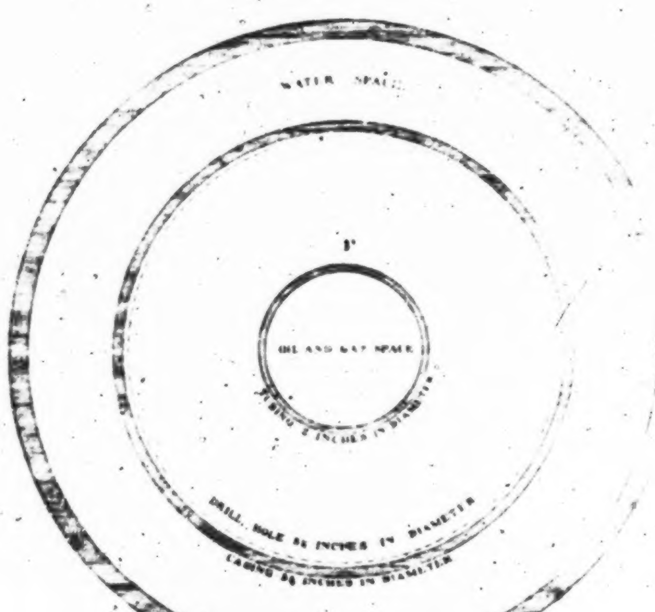


Cross-section of pumping well, wrought-iron drive-pipe, 1878



[Fig. 35—page 47.]

Cross-section of flowing well, 1880

were rarely found entirely destitute of bitumen as an ingredient. This paper attracted much attention. (a) In 1824 Reichenbach discovered paraffine in the products of the destructive distillation of wood, (b) and in the following year Gay-Lussac analyzed it. (c)

In 1826 the British government sent a second embassy to Ava, and in the journal of that embassy the ambassador, Hon. John Crawfurd, again describes the petroleum wells of Rangoon, and furnishes many details respecting the method of their operation and the amount of their product. (d)

Boussingault investigated the bitumen of Pechelbronn, on the lower Rhine, and compared its peculiarities with those of bitumens from other localities. His work on these substances became very celebrated, and has been very widely quoted. (e) These researches created a lively interest in France, and led to much experimenting upon both solid and liquid bitumens, with a view to ascertaining the purposes to which they might be applied.

During this period the first well was bored in the United States that produced petroleum in any considerable quantity. As the first well bored or drilled for brine was the legitimate precursor of all the petroleum wells in the country, an historical account of it is introduced here, taken from a paper written by Dr. J. P. Hale, of Charleston, West Virginia, for the volume prepared by Professor M. F. Maury, and issued by the State Centennial Board, on the resources and industries of the state. He says:

It was not until 1808 that the brothers, David and Joseph Ruffner, set to work to ascertain the source of the salt water, to procure, if possible, a larger supply and of better quality, and to prepare to manufacture salt on a scale commensurate with the growing wants of the country.

The Salt Lick, or "the Great Buffalo Lick", as it was called, was just at the river's edge, 12 or 14 rods in extent, on the north side, a few hundred yards above the mouth of Campbell's creek, and just in front of what is now known as the "Thoroughfare Gap", through which, from the north, as well as up and down the river, the buffalo, elk, and other ruminating animals made their way in vast numbers to the lick. * * *

In order to reach, if possible, the bottom of the mire and oozy quicksand through which the salt water flowed they (the Ruffner brothers) provided a straight, well-formed, hollow sycamore tree, with 4 feet internal diameter, sawed off square at each end. This is technically called a "gum". This gum was set upright on the spot selected for sinking, the large end down, and held in its perpendicular position by props or braces on the four sides. A platform, upon which two men could stand, was fixed about the top; then a swape was erected, having its fulcrum in a forked post set in the ground close by. A large bucket, made from half of a whisky barrel, was attached to the end of the swape by a rope, and a rope was attached to the end of the pole, to pull down on, to raise the bucket. With one man inside the gum, armed with pick, shovel, and crowbar, two men on the platform on top to empty and return the bucket, and three or four to work the swape, the crew and outfit were complete.

After many unexpected difficulties and delays the gum at last reached what seemed to be rock bottom at 13 feet. Upon cutting it with picks and crowbars, however, it proved to be but a shale or crust about 6 inches thick of conglomerated sand, gravel, and iron. Upon breaking through this crust the water flowed up into the gum more freely than ever, but with less salt.

Discouraged at this result, the Ruffner brothers determined to abandon this gum and sink a well out in the bottom, about 100 yards from the river. This was done, encountering, as before, many difficulties and delays. When they had gotten through 45 feet of alluvial deposit they came to the same bed of sand and gravel upon which they had started at the river. To penetrate this they made a 3½-inch tube of a 20-foot oak log by boring through it with a long-shanked auger. This tube, sharpened and shod with iron at the bottom, was driven down, pile-driver fashion, through the sand to the solid rock. Through this tube they then let down a glass vial with a string, to catch the salt water for testing.

They were again doomed to disappointment. The water, though slightly brackish, was less salt than that at the river. They now decided to return to the gum at the river, and, if possible, put it down to the bed-rock. This they finally succeeded in doing, finding the rock at 16 to 17 feet from the surface.

As the bottom of the gum was square and the surface of the rock uneven, the rush of outside water in the gum was very troublesome. By dint of cutting and trimming from one side and the other, however, they were at last gotten nearly to a joint, after which they resorted to thin wedges, which were driven here and there as they would "do the most good".

By this means the gum was gotten sufficiently tight to be so bailed out as to determine whether the salt water came up through the rock. This turned out to be the case. The quantity welling up through the rock was extremely small, but the strength was greater than any yet gotten, and this was encouraging. They were anxious to follow it down, but how? They could not blast a hole down there under water; but this idea occurred to them: They knew that rock-blasters drilled their powder holes 2 or 3 feet deep, and they concluded they could, with a longer and larger drill, bore a correspondingly deeper and larger hole. They fixed a long iron drill, with a 2¼-inch chisel bit of steel, and attached the upper end to a spring pole with a rope. In this way the boring went on slowly and tediously, till on the 1st of November, 1807, at 17 feet in the rock, a cavity or fissure was struck, which gave an increased flow of stronger brine. This gave new encouragement to bore still further; and so, by welding increasing length of shaft to the drill from time to time, the hole was carried down to 28 feet, where a still larger and stronger supply of salt water was gotten.

Having now sufficient salt water to justify it, they decided and commenced to build a salt furnace, but, while building, continued the boring, and on the 15th January, 1808, at 40 feet in the rock and 58 feet from the top of the gum, were rewarded by an ample flow of strong brine for their furnace, and ceased boring.

Now was presented another difficulty: how to get the stronger brine from the bottom of the well, undiluted by the weaker brines and fresh water from above. There was no precedent here; they had to invent, contrive, and construct anew. A metal tube would naturally suggest itself to them; but there were neither metal tubes, nor sheet metal, nor metal workers, save a home-made blacksmith, in all this region, and to bore a wooden tube 40 feet long, and small enough in external diameter to go in the 2¼-inch hole, was impracticable. What they did do was to whittle out of two long strips of wood two long half tubes of the proper size, and, fitting the edges carefully together, wrap the whole from end to end with small twine. This, with a bag of wrapping near the lower end, to fit as nearly as practicable, water tight, in the 2¼-inch hole, was cautiously pressed down to its place, and found to answer the purpose perfectly, the brine flowed up freely through the tube into the gum, which was now provided with a water-tight floor or bottom to hold it, and from which it was raised by the simple swape and bucket.

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a P. T., 1823; A. C. et P. (2), xxv, 278.
b P. M. (2), 4, 402.
c A. C. et P. (2), l, 78.
d *Journal of an Embassy to the Court of Ava*, 1831.
e *Constitution of Bitumens*, P. J. (2), ix, 457.

Thus was bored and tubed, rigged and worked, the first rock-bored salt-well west of the Alleghanies, if not in the United States. The wonder is not that it required eighteen months or more to prepare, bore, and complete this well for use, but, rather, that it was accomplished at all under the circumstances. In these times, when such a work can be accomplished in as many days as it then required months, it is difficult to appreciate the difficulties, doubts, delays, and general troubles that then beset them. Without preliminary study, previous experience, or training, without precedents in what they undertook, in a newly settled country, without steam-power, machine-shops, skilled mechanics, suitable tools or materials, failure rather than success might reasonably have been predicted. * * *

For interesting facts in this history of the boring of the first well I am indebted to a MS. by the late Dr. Henry Ruffner, and for personal recollections and traditions I am indebted to General Lewis Ruffner, Isaac Ruffner, W. D. Shrewsberry, Colonel B. H. Smith, Colonel L. I. Woodyard, W. C. Brooks, and others, and my own experiences for the last thirty years. * * *

Other important improvements were gradually made in the manner of boring, tubing, and pumping wells, etc. The first progress made in tubing, after Ruffner's compound wood-and-wrapping-twine tube, was made by a tinner who had located in Charleston. * * * He made tin tubes in convenient lengths, and soldered them together as they were put down the well. The refinement of screw joints had not yet come, but followed shortly after, in connection with copper pipes, which soon took the place of tin, and these are recently giving place to iron.

In the manner of bagging the wells, that is, in forming a water-tight joint around the tube to shut off the weaker waters above from the stronger below, a simple arrangement, called a "seed-bag", was fallen upon, which proved very effective, and which has survived to this day, and has been adopted wherever deep boring is done as one of the standard appliances for the purpose for which it is used. This seed-bag is made of buckskin or soft calfskin, sewed up like the sleeve of a coat or leg of a stocking, made 12 to 15 inches long, about the size of the well hole, and open at both ends; this is slipped over the tube and one end securely wrapped over knots placed on the tube to prevent slipping. Some six or eight inches of the bag is then filled with flaxseed, either alone or mixed with powdered gum tragacanth; the other end of the bag is then wrapped like the first, and the tube is ready for the well. When to their place—and they are put down any depth to hundreds of feet—the seed and gum soon swell from the water they absorb, till a close fit and water-tight joint are made. * * *

In 1831 William Morris, or "Billy" Morris, as he was familiarly called, a very ingenious and successful practical well-borer, invented a simple tool, which has done more to render deep boring practicable, simple, and cheap than anything else since the introduction of steam.

This tool has always been called here "slips", but in the oil regions they have given it the name of "jars". It is a long double-link, with jaws that fit closely, but slide loosely up and down. They are made of the best steel, are about 30 inches long, and fitted, top and bottom, with pin and socket joint, respectively. For use they are interposed between the heavy iron sinker, with its cutting chisel-bit below, and the line of auger poles above. Its object is to let the heavy sinker and bit have a clear, quick, cutting fall, unobstructed and unincumbered by the slower motion of the long line of auger poles above. In the case of fast auger or other tools in the well, they are also used to give heavy jars upward or downward, or both, to loosen them. From this use the oil-well people have given them the name of "jars".

Billy Morris never patented his invention, and never asked for nor made a dollar out of it; but as a public benefactor he deserves to rank with the inventors of the sewing-machine, reaping-machine, planing-machine, printing cylinders, cotton-gin, etc. This tool has been adopted into general use wherever deep boring is done, but outside of Kanawha few have heard of Billy Morris, or know where the slips or jars came from. * * *

The Kanawha borings have educated and sent forth a set of skillful well-borers all over the country, who have bored for water for irrigation on the western plains, for artesian wells for city, factory, or private use, for salt water at various places, for oil all over the country, for geological or mineralogical explorations, etc.

Nearly all the Kanawha salt-wells have contained more or less petroleum, and some of the deepest wells a considerable flow. Many persons now think, trusting to their recollections, that some of the wells afforded as much as 25 to 50 barrels per day. This was allowed to flow over from the top of the salt cisterns to the river, where, from its specific gravity, it spread over a large surface, and by its beautiful iridescent hues and not very savory odor could be traced for many miles down the stream. It was from this that the river received the nickname of "Old Greasy", by which it was for a long time familiarly known by Kanawha boatmen and others.

At that time this oil not only had no value, but was considered a great nuisance, and every effort was made to tube it out and get rid of it. It is now the opinion of some competent geologists, as well as of practical oil men, that very deep borings, say 2,500 feet, would penetrate rich oil-bearing strata, and possibly inexhaustible supplies of gas.

In Ohio salt was manufactured at the "Old Scioto salt works", in Jackson county, as early as 1798, from brine obtained from dug wells. In 1808, after the successful boring of the Ruffner well on the Kanawha, bored wells were substituted for dug wells very successfully, and salt-wells were soon in operation in other localities. The valley of the Muskingum from Zanesville to Marietta soon became noted, and the valley of Duck creek, since the center of the Washington county petroleum fields, was first famous for its salt-wells.

The following description is from an article in the *American Journal of Science* (1), xxiv, 63, by Dr. S. P. Hildreth, of Marietta:

Since the first settlement of the regions west of the Appalachian range the hunters and pioneers have been acquainted with this oil. Rising in a hidden and mysterious manner from the bowels of the earth, it soon arrested their attention, and acquired great value in the eyes of these simple sons of the forest. Like some miraculous gift from heaven, it was thought to be a sovereign remedy for nearly all the diseases common to those primeval days, and from its success in rheumatism, burns, coughs, sprains, etc., was justly entitled to all its celebrity. It acquired its name of Seneca oil, that by which it is generally known, from having first been found in the vicinity of Seneca lake, New York. From its being found in limited quantities, and its great and extensive demand, a small vial of it would sell for 40 or 50 cents. It is at this time in general use among the inhabitants of the country for saddle bruises and that complaint called the scratches in horses. It seems to be peculiarly adapted to the flesh of horses, and cures many of their ailments with wonderful certainty and celerity. Flies and other insects have a natural antipathy to its effluvia, and it is used with much effect in preventing the deposit of eggs by the "blowing fly" in the wounds of domestic animals during the summer months. In neighborhoods where it is abundant it is burned in lamps in place of spermaceti oil, affording a brilliant light, but filling the room with its own peculiar odor. By filtering it through charcoal, much of this empyreumatic smell is destroyed and the oil greatly improved in quality and appearance. It is also well adapted to prevent friction in machinery, for, being free of gluten, so common to animal and vegetable oils, it preserves the parts to which it is applied for a long time in free motion; where a heavy vertical shaft runs in a socket, it is preferable to all or any other articles. This oil rises in greater or less abundance in most of the salt-wells of the Kanawha, and, collecting as it rises, in the head on the water, is removed from time to time with a ladle.

coal, the production was so enormous, as compared with the demand, that the market was soon glutted and the price fell to almost nothing. An extended demand, and the partial exhaustion of the territory then being worked, led to better prices in 1865, and the immediate result was the boring of wells over an immense extent of country, from Manitoulin island to Alabama, and from Missouri to central New York. In Europe companies were also formed, and wells were put down wherever an oil-spring existed. In the United States the result was the permanent development of a small territory in southern Kentucky, another still larger in West Virginia and in Washington county, Ohio, and another in Trumbull county, Ohio, at Mecca. In Pennsylvania oil was found at Smith's Ferry, on the Ohio river, in Beaver county, and the hill region lying in the angle formed by Oil creek and the Allegheny river from Tidioute across to Titusville was explored and several localities of great richness were opened up.

Henry, in *Early and Later History of Petroleum*, pages 109 and 110, says:

> The total daily product of all the wells in June, 1860, was estimated at 200 barrels. By September, 1861, the daily production had reached 700 barrels, and then commenced the flowing-well period, with an addition to the production of 6,000 or 7,000 barrels a day. The price fell to 20 cents a barrel, then to 15, and then to 10. Soon it was impossible to obtain barrels on any terms, for all the coopers in the surrounding country could not make them as fast as the Empire well could fill them. Small producing wells were forced to cease operations, and scores of operators became disheartened and abandoned their wells. The production during the early part of 1863 was scarcely half that of the beginning of 1862, and that of 1864 was still less. In May, 1865, the production had declined to less than 4,000 barrels per day.
>
> Commencing at Titusville in 1859, the tide of development swept over the valley of Oil creek and along the Allegheny river above and below Oil City for a considerable distance: then Cherry run, in 1864. Then came Pithole creek, Benninghoff and Pioneer run; the Woods and Stevenson farms, on Oil creek, in like succession, in 1865 and 1866; Tidioute and Triumph hill in 1867, and in the latter part of the same year came Shamburg. In 1868 the Pleasantville oil-field furnished the chief center of excitement.

While this great activity was being displayed in Pennsylvania, the old salt and petroleum region in the valley of the Muskingum, in Ohio, and on the Little Kanawha, in West Virginia, was bored for petroleum, and several wells of great productiveness were obtained. In 1860 an old brine well at Burning Springs, West Virginia, that had yielded petroleum, was cleaned out, the water tubed off, and about fifty barrels of oil per day secured. In the following winter the Llewellyn well was struck at about the depth of 100 feet, and it flowed over 1,000 barrels a day. Several other good wells were secured, when, during a confederate raid, the property was destroyed and the operators were driven away. In 1864 operations were resumed, deeper wells producing a large amount of oil, and speculation and excitement ran to a high pitch. In 1865 operations were successfully undertaken at White Oak, which resulted in developing the most extensive and best known West Virginia territory. From 1860 to 1865 wells were successfully drilled on Cow run and at other localities in Washington county, Ohio.

For more than a century bitumen had been known in southern California between Santa Barbara and Los Angeles, and had also been observed floating upon the sea in the Santa Barbara channel between the islands and the mainland. Early in 1864 this region was visited by an eminent eastern chemist, who was so far misled by false local representations and by gross deceptions practiced upon him as to induce him to make a report upon this as a petroleum-producing region of great richness. This report, and others of a similar character, led to the formation of mining companies representing stock to the value of millions of dollars, all of which, it is needless to add, was lost to the *bona fide* investors. Several hundred thousand dollars were spent in boring wells, but few of them produced sufficient petroleum even to serve as a specimen, and none, so far as I am informed, paid the cost of boring. A few years of effort found the companies with depleted treasuries and no oil, and with a large amount of land and apparatus on their hands. On one estate 5,000 barrels in shooks, shipped from New York, were rotting down in a huge pile before a drop of petroleum had been obtained from beneath its surface. While these magnificent enterprises were becoming magnificent failures, more humble efforts were achieving a measure of success in driving tunnels into the steep mountain sides upon the petroleum-bearing rock. The total production of this region, however, never reached above a few thousand barrels of inferior quality per year, and the San Francisco market continued to be supplied almost exclusively with Pennsylvania petroleum shipped around cape Horn. (a)

From 1870 to 1880 the region between Tidioute and Oil creek has constantly become relatively of less importance when compared with the entire area of producing territory in Pennsylvania. At the beginning of this decade the production of this region had considerably lessened, and a number of new and very successful wells farther down the Allegheny river were attracting attention in that direction. Wells had been put down near the junction of the Clarion and Allegheny rivers as early as 1863 and 1864, but very little notice had been taken of them at the time; and it was not until 1868 that a successful well on the hill above Parker's landing attracted the attention of the bolder operators and led to the development of what is termed the "lower country", lying in Butler, Armstrong, and Clarion counties. In 1867 Mr. C. D. Angell had developed a very productive oil property on Belle island, in the Allegheny river, 25 miles below Oil City. While carrying forward his work he was busily investigating the occurrence of petroleum by studying the relative position of the most productive wells. He had observed in the "upper country" that a narrow belt extending across from Scrubgrass, on the Allegheny river, to Petroleum Center, on Oil creek, included many of the best wells in that region. In the "lower country" he

a Advices from the Pacific coast indicate that during the years 1880 and 1881 a petroleum interest that promises some local value has been developed in a portion of the state farther north than that here referred to.

exerted in consequence, and (3) the enormous pressure under which the oil is held in the rock and forced out when the reservoir is perforated, there seems to be no reasonable ground for doubting the sufficiency of such a source of supply. This opinion receives further confirmation from the large content of oil proved by Dr. Hunt to exist in the Chicago limestone (see page 63).

J. F. Carll has shown by experiment that the pebble sand will absorb from one-fifteenth to one-tenth of its bulk of oil, and, further, that "the aggregate sum of the pores or interspaces of a sand-rock of this kind, as exposed in the walls of a well of 5½ inches diameter, is equivalent to the area of an open crevice one inch wide, extending from top to bottom of the gravel bed, whatever its thickness may be". He further shows that "on Oil creek there is generally from 30 to 50 feet of third sand, and also from 15 to 30 feet of stray sand, both locally producing oil. Of this total, suppose only 15 feet is good oil-bearing pebble, we shall then have a producing capacity of 15,000 barrels per acre, or 9,600,000 barrels per square mile, which is adequate to the requirements of the most exceptional cases known". (a)

While the Warren and Bradford sands are quite dissimilar from the Venango sand, their porosity is sufficient to hold their content of oil.

The occurrence of so-called slush oil at North Warren and at Limestone, in the Tuna valley, has been attributed to fissuring of the sandstones and shales in such a manner as to allow the oil to rise into the fissures in the shales. These cases are local and exceptional, and are therefore not to be regarded as typical of the manner in which oil occurs generally.

SECTION 8.—THE MANAGEMENT OF WELLS.

Having shown how the oil-well is carried down upon a reservoir of sufficient capacity to contain a remunerative quantity of oil, it will next be shown how the well is managed after it is drilled and torpedoed. The present methods of management are the result of an historical progressive development, which will be best understood if discussed chronologically and in connection with the figures in Plate VI and the sections, Figs. 32, 33, 34, and 35. Figs. 1, 2, and 3, Plate VI, and Figs. 32, 33, and 34 were originally drawn by H. Martyn Chance, to accompany Mr. Carll's report, and were afterward redrawn by Miss Laura Linton, with some changes, to bring them into conformity with Fig. 4, drawn by Mr. Opperman. An examination of these figures shows the well divided into four sections, viz: the surface section, the bottom of the drive-pipe section, the bottom of the casing section, and the bottom section These different sections show the arrangements at the derrick floor, at the bottom of the drive-pipe, at the bottom of the casing or seed-bag section, and at the bottom of the well. Fig. 1, Plate VI, and Fig. 32 show a well as arranged in 1861. It is the direct descendant of the well of the Ruffner Brothers, and was then in use around Tarentum and elsewhere for salt-wells. From the well-head at the derrick floor to the bed-rock was a plank conductor or drive-pipe, which held the loose sand or gravel of the drift. From the bottom of this conductor to the bottom of the well the rocks through which the drill had cut formed the walls of the bore, which was 4 inches in diameter. Within this 4-inch hole a 2-inch pipe was inserted, with the pump-barrel screwed to its lower end. At a point estimated to be below that at which the water infiltrating the surface rocks entered the well the "seed-bag" was fastened in such a manner as to stop off this water from entering the bore of the well below. The pump-barrel being securely screwed to a length of pipe, it was lowered into the well, and piece after piece connected, until the point at which the seed-bag was to be introduced was reached; then a bag of calfskin or buckskin was securely tied to the pipe immediately below a thimble to prevent it from sliding. This bag was filled with flaxseed, and the upper end was so insecurely tied that if the tube was raised the bag would turn and empty itself. It was then lowered and the pipe added joint by joint until the required amount was put in. Beneath the thimble, at the end of the last joint, clamps were placed and securely fastened above the head-block, which rests upon the derrick floor. As the seed-bag absorbs moisture it expands and fills the 4-inch hole so completely that all of the water above the bag is held and prevented from passing below. Of course this well is drilled wet, that is, full of water, no attempt being made to stop off this water until the oil is reached and the well is prepared for pumping. If for any reason it became necessary to withdraw this tubing, the seed-bag came with it, and the water flowed into the bottom of the well.

Fig. 2, Plate VI, and Fig. 33 show the well of 1868. At this time it had become customary, after sinking the conductor or cast-iron drive-pipe to the bed-rock, to commence a 5½-inch hole, which was continued to the bottom. The position of the seed-bag was then determined, and it was securely fastened to the lower end of a section of casing-pipe 3¼ inches inside diameter. This was lowered to the proper depth. The 2-inch tubing, with the pump attached, was then lowered to the proper depth and secured at the top with the proper clamp. This well was of course drilled full of water, as the water was not stopped off until the tools were drawn out and the casing inserted. Instead of the ordinary seed-bag, a patent packer was sometimes attached to the casing in place of it. This packer was formed by pressing a sort of leather cup over an iron ring that was a little smaller than the drill-hole and was fastened to the outside of the casing. The pressure of the column of water above held the leather firmly to the drill-hole when the oil was pumped from below. Sometimes, as is represented in the figure, both the cup-packer and seed-bag were used at the same time. A casing-head was screwed on, usually with one or two outlets for gas,

a Rep. Sec. Geo. Surv. Penna., III, p. 253.

435

and the gas that escaped inside the casing and outside the tubing could thus be utilized as fuel: at the same time the casing-head took the place of the head-block and formed a support for the tubing. In this way the casing was made a permanent fixture, effectually stopping off the water and permitting the tubing to be introduced or taken out at pleasure.

Although this method of drilling and casing wells was a great improvement over those previously employed, it still presented two very grave defects: First, the well must be drilled full of water, and, second, the hole was larger than the casing, and accidents sometimes occurred, which made it necessary to draw the casing and let the water into the well. To remedy these defects the plan was adopted that is shown in Fig. 3, Plate VI, and Fig. 34. According to this plan an 8-inch iron pipe is driven to the bed-rock. An 8-inch hole is then carried down below the surface water. The drilling-bits are then made smaller, and the hole is contracted to 5¼ inches. A second tube, armed with a steel shoe, is then carried down inside the drive-pipe, and ground in the tapering drill-hole to a water-tight joint. This casing thus effectually cuts off the water. The 8-inch jars and drills are exchanged for 5¼-inch tools, and the hole is carried down from that point of the same diameter as the interior of the casing to the bottom of the well, with only water enough introduced to sand-pump properly. The buoyancy imparted to the tools and cable by 1,000 to 1,500 feet of water is thus avoided, and the presence of oil in any of the strata penetrated is immediately manifested by escaping gas and soiled tools, and sometimes by a gush of oil that fills and overflows the well before the tools can be withdrawn.

Mr. Carll (Report III, *Second Geological Survey of Pennsylvania*, page 320) estimates that "the average cost of drilling cased wells (especially if we take into account the reduced liability to accidents from tool-sticking, etc.) is probably little, if any, greater than it would be if they were drilled wet. Quite an item in the cost of fuel is sometimes realized, for a vein of gas may be struck several hundred feet from the bottom of the well, which will fire the boiler until the work is finished".

The advantage of having a hole of the same diameter all the way down is very great when fishing operations are necessary, and also when the packers which are now used are to be inserted. These are used in preparing the well for flowing, and their use is represented in Fig. 4, Plate VI, and Fig. 35, where a cased well, with tube and packer, are indicated in full operation. These packers are of rubber, and are so constructed that the tube within them moves in a sliding joint. The lower piece of pipe enters the bottom of the mass of rubber, and the upper section, being securely fastened to the upper portion of the mass, slides in the lower section in such a manner as to press with its whole weight against the rubber and force it against the sides of the drill-hole. A well prepared for flowing as represented in Fig. 4, Plate VI, and Fig. 35, and properly connected with a tank, will operate with very little attention for months. The flow will finally run down either from the exhaustion of the supply or the clogging of the pipes with paraffine.

The clogging of pipes with paraffine occasions a great deal of trouble in the Bradford district. This is occasioned, first, by the much larger percentage of paraffine in the Bradford oil, and, second, from the condensation of the less volatile and soluble paraffines, due to the very intense cold produced by releasing the oil from the high pressure under which it exists in the rock, and consequently rapid evaporation of the more volatile portions. No attempt has been made to ascertain accurately this temperature, but many incidental facts indicate that it is very low.

After a well has ceased to flow, and in those localities where the gas pressure is not sufficient to cause the oil to flow, the well is pumped. In the method of pumping represented in Fig. 1, Plate VI, and Fig. 32 the sucker-rods were introduced immediately after the pipe and seed-bag, and, after the seed-bag had had time to swell, connection was made with the walking-beam, and the water pumped out below the seed-bag. After this water was removed and its pressure taken from the rock the gas and oil entering the well were brought to the surface. With the adoption of the first method of casing wells (Fig. 2, Plate VI, and Fig. 33), the water was removed from the space between the casing and tubing, and the oil-rock being quickly relieved of its pressure, the oil and gas rushed in to supply its place, and after the removal of the water was brought to the surface. With the drilling of dry holes the method of pumping represented in Fig. 3, Plate VI, and Fig. 34 has been adopted. In this well there is no water to pump, and the oil is brought to the surface as long as any will enter the well. Sometimes so-called gas-pumps are applied to wells that have ceased to yield oil and a partial vacuum has been created, with the result of causing the oil to flow laterally into the well through the rock.

In some localities, where the oil is valuable and the yield of the wells small, as among the heavy-oil wells of the Franklin district or in the older portions of the Oil Creek district, a method of pumping wells by sucker-rod connections has been adopted. The use of sucker-rods was no doubt adopted on account of the fact that old rods were suitable, numerous, and cheap. An engine is attached to a circular horizontal table by an elbow-joint in such a manner that it is made to perform a quarter revolution and return to its former position. To the circumference of this table from two to a dozen or fifteen connections are made, in such a manner that each connection is given an equal stroke sufficient to move a pump connection, such as is represented in Fig. 36. The pull of the engine comes on the down-stroke of the pump, and the up-stroke of the pump is balanced by the stones or other heavy material placed in a box on the arm, *a*. The rods by which these connections are made for long distances are

supported by light frames, which have a swinging motion as the rods move slowly to and fro. In the Franklin district, where the wells are shallow, the rods are made of strips of ash 2½ inches square, nailed together by wooden straps. From thirty to forty wells are thus sometimes attached to one engine. In the White Oak district of West Virginia, where the ground is too uneven to admit of wooden connections, motion is communicated to a dozen or more wells by an endless rope, usually of wire, that is supported on wheels and runs up one hill and down another and along the valleys to a convenient site for the engine. By this method wells can be profitably pumped that would otherwise have to be abandoned.

At the Katie Hough well, on Mud run, in the White Oak district, West Virginia, in the summer of 1881, the curious phenomenon was exhibited of pumping two kinds of oil from the same well. In this region there are several oil horizons, and at the point penetrated by this well the first White Oak sand produces oil of 27° specific gravity, and third White Oak sand beneath it yields oil of 45° specific gravity. The well was in 1865 put down 255 feet to the first White Oak sand, and was pumped at intervals for 15 years; it was then reamed to an 8-inch hole, and a 4½-inch hole sunk to the third sand. A tube, with a seed bag at the bottom of the 8 inch hole, was inserted, and the heavy oil stopped off. From this tube amber oil of 45° specific gravity is pumped from the third sand. A second pump and tube was then inserted in the 8-inch hole beside the other tube and proper connections made with the walking-beam, every stroke of which pumped dark, heavy oil of 27° specific gravity from the first sand, worth $7 per barrel, and amber oil of 45° specific gravity from the third sand, worth $1 per barrel. The Shaw well, o. Gales' Fork, also in the White Oak district, said to have produced $80,000 worth of oil, pumps oil of 25° specific gravity from a depth of 160 feet and an oil of the specific gravity of 40° at a point between 600 and 700 feet.

It has been the custom around Titusville and Pleasantville, when the production of a well ran very low, to introduce into it five to ten barrels of crude naphtha (benzine), and after allowing it to remain for a few days to resume pumping, an increased production being the result.

The large amount of oil that has at different times and in certain localities run to waste upon the streams has been due to unavoidable waste, to the bursting of pipes and tanks, the sinking of barges, and to oil which has escaped destruction during extensive fires. On the Allegheny river at Oil City may always be seen a thin film of oil often sufficient to produce iridescence. The quantity of oil required to produce this effect, although apparently very small, is in the aggregate quite large. Where booms are stretched across such streams the floating oil is arrested and may be pumped from the surface with water into settling tanks and collected. In this way the collection of oil has been made a profitable business, as occasion might warrant, thousands of dollars' worth having been gathered in a single season that would otherwise have gone to waste. In 1862, 4,000 barrels were dipped from the Allegheny river and was used for lubricating oil and for making lampblack.

The occurrence of oil in the drift gravels beneath the superficial clays south of Titusville has already been mentioned (see page 49). The oil here was pumped from shallow wells, dug only a few feet into the gravel. (a)

SECTION 9.—YIELD OF WELLS.

The average duration of the profitable production of an oil-well is very uniformly estimated at five years, but this period is subject to very great variations. The wells in the Colorado district, northeast of Titusville, have been pumped about twelve years, and have yielded constantly enough to more than pay expenses. In the White Oak district of West Virginia the Scott and Scioto wells, drilled in 1865, were being pumped in 1880. On the contrary, the Cole creek portion of the Bradford field had all been drilled over since 1879, and some of the wells were abandoned before June 4, 1881, while at the same date wells were flowing near Tarport, in the same field, that were drilled in 1875. As a general rule, it may be said that the nearer the wells are to each other on a given piece of property the sooner they will become unprofitable.

As an illustration: On Triumph hill eight wells were drilled in a group, two on the edge of the belt and six nearer the center. As each well was drilled it commenced to yield at the rate those previously drilled were yielding at that time. The first well was drilled in 1866, and yielded an average daily production for the first six months of 70 barrels, the second six months 41 barrels, the second year 35 barrels; it then fell off gradually until it reached 5 to 7 barrels, where it remained for two or three years; it then continued to fall, until for the three years preceding 1881 the yield was only about 1 barrel a day. The eight wells were pumped with sucker-rods by one engine. The six central wells were 9 or 10 rods apart. The sand in the center of the Triumph belt is more than 100 feet thick.

The Economites drilled two wells on their tract upon the hill east of Tidioute 300 feet apart. They started at 100 barrels a day and held it three months, then ran down to 25 barrels in two years, and during the two years following ran down to 200 barrels a week and held about that yield for two years. Two wells were drilled in

a In the summer of 1881 quite an excitement was occasioned in Titusville by the discovery of oil saturating gravel beneath the soil of gardens along the creek. Several hundred barrels were pumped and dipped from holes or pits dug over an area of several acres. It was supposed to have been the leakage from loading racks during the Pithole development.

positions *a* and *b*. They started at 125 barrels each, and in eighteen months ran down to zero. The rigs were then changed to the other side of the engines at *a'* and *b'* and the wells were redrilled. They were drilled deeper into the sand the second time, and were cased with 5⅝-inch instead of 3¼-inch casing. These second wells started off at 75 barrels a day and lasted ten years. The first wells were drilled by a man who had a hobby that 10 feet in the sand is sufficient, but the second wells were drilled through 25 or 30 feet of sand.

a *a'*

b' *b*

The yield of some single wells has been enormous. One half of the Empire well was sold for $900, and it afterward yielded $12,000 in six days. Its owners saved 3,500 barrels a day and sold it for 10 cents a barrel. The owners of the land were unable to furnish barrels, and the royalty was put into pits dug in gravel. Well No. 4, on the Jacob and John Hemphill farm, Donegal township, Butler county, Pennsylvania, struck by McKinney Brothers in September, 1873, has produced about 110,000 barrels, and is still (1881) producing six barrels daily. The farm upon which this well is located is among the most prolific oil properties ever developed, twelve wells thereon producing over 750,000 barrels. The Divner well, No. 1, Divner farm, Butler county, Pennsylvania, has yielded about 200,000 barrels, and six years after being struck produced 13 barrels a day. The Boss well, on the J. A. Parker farm, in Armstrong county, Pennsylvania, produced about 80,000 barrels. The amount yielded by any one well in the Bradford district is much smaller, from 20,000 to 25,000 barrels being probably the highest yield.

SECTION 10.—FLOODING.

The proximity of other outlets appears to determine the duration of the flow of oil-springs or wells. The spring in the island of Zante is known to have flowed two thousand years. The Beatty well, in Wayne county, Kentucky, drilled in 1819, is still flowing, there being no other well near it. The American well yielded oil in large quantities from 1830 to 1860, but after the drilling of other wells in the neighborhood the yield fell off, and finally ceased altogether. It is therefore impossible for any producer controlling a small area to preserve his oil beneath the surface. The lateral flow of oil and water through the oil-sand has been repeatedly demonstrated. Jonathan Watson, in his experience, had known water to run into a well when the seed-bag was removed from another one-half mile distant and in another instance red paint was put into one well and pumped out of another at about the same distance.

J. F. Carll, in Report III, *Geological Survey of Pennsylvania*, page 258, says:

The National well No. 1 was struck in February, 1866. It was very near the northwesterly edge of a large and well-stored pool, and passed through rather an inferior oil rock as compared with that afterward found on the axis of the belt. Still it had a sufficiently free connection with the supplying reservoir to furnish a delivery of about 85 barrels per day, and it maintained its production with wonderful constancy for two years, having only declined to about 60 barrels in that time. In the summer of 1868 wells were drilled on the center of the deposit from which it had been deriving its supply. Some of these wells produced as much as 150 barrels per day. The effect on the National was immediately apparent. Its production dropped off rapidly and dwindled down to 10 barrels or less a day. * * *

Harmonia well No. 1 was on the thriving northerly edge of the Pleasantville belt. The main body of oil and the best sand-rock, as afterward demonstrated, lay to the south. It started with a small yield, and at the end of a fortnight was pumping about 30 barrels per day. Gradually increasing its production, as if enlarging and cleaning out the passages leading into the supplying reservoir, it finally commenced to flow, and ran up to 125 barrels, where it remained until wells of larger flow were drilled on the center of the belt and relieved the gas pressure, when pumping had to be resumed. After this it soon fell down to an unremunerative production and was abandoned

The early method of drilling with the well full of water prevented the escape of the oil and gas until the water was pumped out; when the rock is pierced with a hole drilled dry "the effect is similar to the sudden liberation of the safety-valve of a boiler under a full head of steam, * * * "the boiling, foaming mass is driven upward against the forces of gravity", and sometimes shoots high above the top of the derrick. The equilibrium which had been maintained for ages throughout the communicating portions of the rock is suddenly destroyed in the immediate proximity of the well by this sudden rush up the drill-hole, and material gaseous at the ordinary temperature and pressure, but fluid under the enormous pressure maintained in the oil-rock, expands and evaporates as it rushes to the surface. This action goes forward, slowly reducing the pressure upon all the communicating portions of rock, until the pressure on the oil filling the rock is only equal to that of the column filling the drill-hole. The pump is now used to lift the fluid from the drill-hole, the oil being still under the pressure of the gas ascending between the tubing and casing. The rock is still full of oil, and the pumping goes on until the pressure of the gas is scarcely sufficient to send any of it to the surface, when a gas-pump is applied at the casing-head to one of the lateral tubes and the pressure of the atmosphere removed. Still, after all this has been done, there is oil remaining in the rock. As before intimated, the oil and gas mutually dissolve each other and form a homogeneous mass, "the gas being as thoroughly incorporated with the oil as gas is with water in a bottle of soda-water." The effects of "flooding" or allowing water to enter the rock partially exhausted of its oil has been the subject of much controversy. Some producers imagine that if the rock is properly flooded the oil can be driven toward certain points and removed to advantage, but experience has proved such operations extremely hazardous.

J. F. Carll has discussed this subject in great detail, and I am greatly indebted to his report and private conversations for information on this subject. He says: (a)

The first intimation of the flooding of a district is given by an increased production from the wells affected by it. Old wells improve gradually, running up from 5 to 10 or 20 or even 50 barrels. After pumping in this way for some time, the oil quickly fails, and they yield

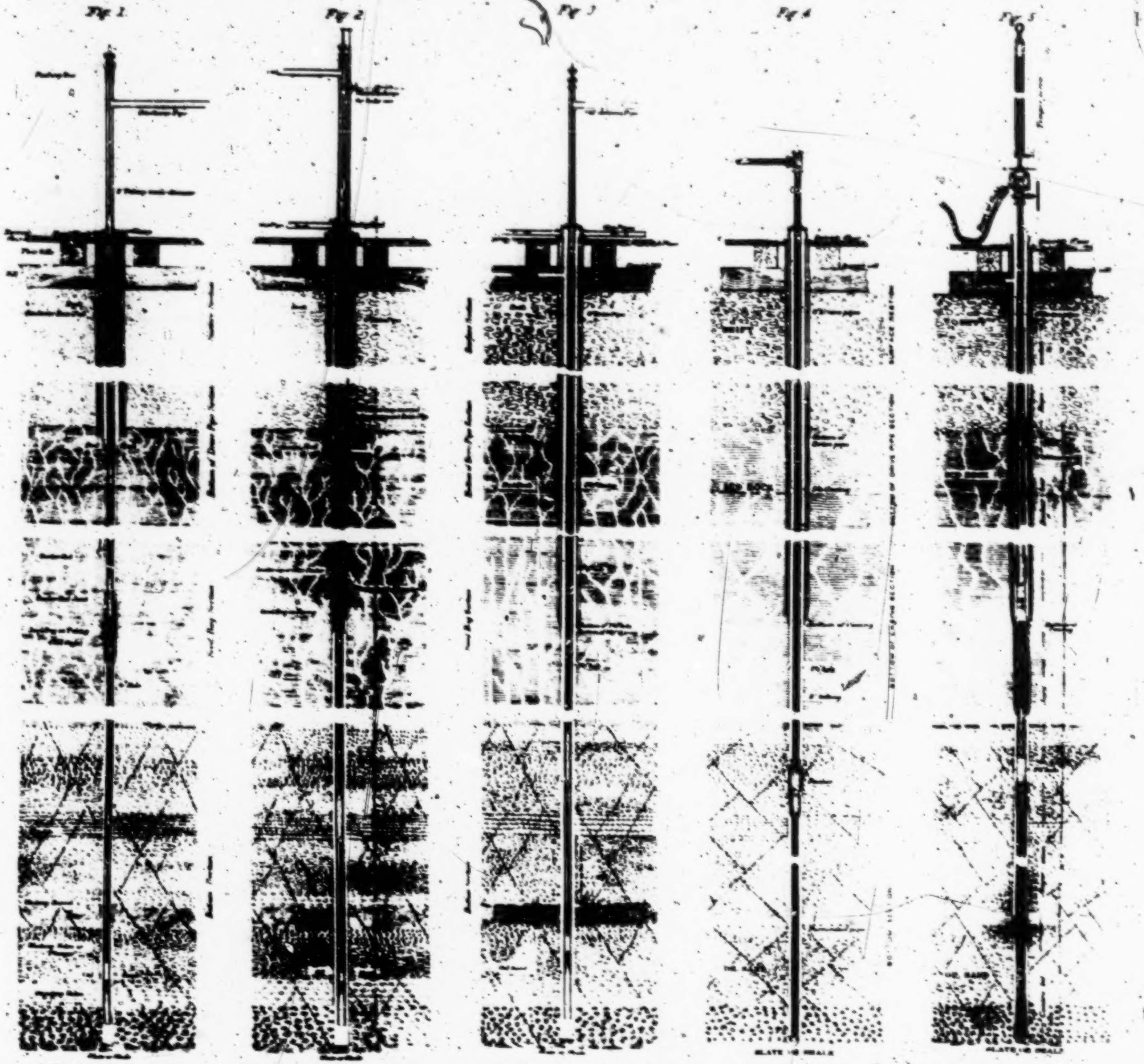
a J. F. Carll, Report III, p. 265.

only a few barrels of salt or brackish water. * * * In some districts the movement is quite rapid, and wells are invaded and "watered out" in quick succession; in others it is so slow that large quantities of oil are obtained from those which are favorably located to receive a "benefit". Flooding a well is sometimes a very profitable way of closing up its career, inasmuch as it thus yields more in a few months than it otherwise would in years, and when the water reaches it the owner knows at once what it betokens and stops work, thus saving the time and money usually expended in fruitless efforts to reclaim a well failing through natural decline. * * * In judging of the probable effects of the introduction of water into any particular oil district several things are to be considered. (1) *The time of flooding*, whether early in the progress of development, while yet a large percentage of oil remains unexhausted, or at a later period, after the supply has suffered from long-continued depletion. (2) *The structure of the rock*, whether regular and homogeneous throughout, or composed of fine sand interbedding and connected and irregular layers of gravel, sometimes lying near the top and at others near the bottom. (3) *The shape of the area being flooded.* (4) *The position of the point at which water is admitted* in relation to the surrounding wells still pumping oil. (5) *The height* (which governs the pressure) *of the column of water* obtaining admittance. (6) *The duration of the water supply.* It will readily be seen that a *temporary flooding* of comparatively *fresh territory*, such as frequently occurred in early days along Oil creek, from the drilling of new wells without casing or the overhauling of old ones when the seed-bag was attached to the tubing in the primitive way, must necessarily be quite a different affair from one caused by a *permanent deluge* through unplugged and abandoned wells *in nearly exhausted territory*. In the former case the flood may be checked before much water has accumulated in the rock, and then the oil-flow can be reclaimed after a few days of persistent pumping; in the latter, the recovery of the oil is very uncertain, because from its long-continued extraction a greater capacity has been given to the rocks for storing water, and this being supplied from scattered and obscure sources, there is little probability that it can be shut off, although the most thorough and systematic attempts may be made to check it.

The effect of flooding upon adjacent wells is illustrated by the following incident related of the Oil Creek district: A and B owned wells 200 feet apart. A's pumped about 10 barrels a day and B's 30. B wished to pump his, but A thought his would not pay and stopped, when B soon found he could get only water. B offered A $10 per day to pump his well ten days. At the end of ten days A refused to pump, then B offered him $25 a day for twenty-five days, at the end of which time B offered A $30 a day to pump his well an indefinite period, and A consented. In the mean time the oil in B's well increased gradually until it reached 75 barrels a day, and the operation proved profitable.

This flooding of oil territory has been proved of such importance that the legislature of Pennsylvania has affixed a penalty to any neglect to "plug" abandoned wells. The plugging consists in filling them with sand. A moment's reflection will show that the owner of oil territory must have it drilled or it will be exhausted by his neighbors drilling a cordon of wells around his property. After it is drilled, the wells must flow until the pressure of gas is exhausted, or, as has been known in several cases, the casing and tubing will be thrown out of the well. A case is on record where the casing-head was anchored down with chains and the flow of oil arrested, yet the gas pressure tore away the fastenings and threw the casing out through the top of the derrick. After the oil has stopped flowing, if the well-owner does not pump, his neighbor's pumps will drain his territory, and if he "pulls out", the law compels him to fill his well with sand and ruin it forever, to prevent the public injury resulting from letting down surface water into the oil-sand. There is therefore no other alternative presented to the unfortunate possessor of oil territory but to drill and produce, whatever the price of oil may be.

Plate 17.



PUMPING WELL 1861 PUMPING WELL 1868 PUMPING WELL 1878 FLOWING WELL 1880 [illegible] WELL AND [illegible]

2. *Lateral leakage.*—In being forced up, the water will flow off sideways at its first opportunity. If, therefore, at any point in the upper portion of the well, it finds a crevice, or channel, or a porous bed, which is not occupied by water under as great pressure as itself, it will escape laterally, instead of forcing the column to the surface. It is necessary to prevent this lateral leakage. Sometimes the necessities of drilling lead to a satisfactory prevention. In sinking the well through the soil, sand, gravel, clay, or other loose material that may lie above the bed rock, it is customary to force down an iron tube, and sink it a few feet into the bed rock, by using a larger bit than that employed for the rest of the well. If a good joint is made here, and the rock below is tight, the lateral leakage may be thereby cut off, but this is not always available nor usually reliable. Besides, in many instances, the upper beds permit much waste, and recourse must be had to special methods for its control.

3. *Control of flow.*—It is clear, upon consideration, that perfect control may be obtained by putting down a tube to the densest portion of the upper confining bed, if, by some device, the space surrounding it may be closed up, so that no water can rise outside of the tube. Formerly, this was done by a very simple and ingenious device, known as the *seed-bag*. A long, stout, leather bag is made in the form of a cylinder, open at both ends, and just the size of the well bore. This is slipped on the lower end of the pipe, and the bottom of the bag securely fastened about the tube by wrapping with marline. A thimble just above the tie will aid in preventing slipping. It is then filled with dried flax-seed, and the upper end likewise closed around the tube. When thus adjusted it is lowered into the well to the point determined upon, and supported there until the seeds swell by absorbing water. This enlarges the bag so as to fit the bore tightly and shut off all water from rising outside the pipe, and so all is compelled to ascend through the tube to the surface, or, at least, as high as the pressure is competent to force it.

FIG. 25.—Seed-bag: *a*, delivery tube, leading to the surface of the well, and terminating below the seed-bag; *c*, a leather bag filled with dry flax-seed, *b*, marline wrappings to secure the end of the seed-bag.

A better and more convenient, but more expensive, packing takes advantage of the expansion of rubber disks when pressed together, instead of the swelling of flax-seed. A series of thick, washer-like rings

of rubber are fitted about a section of pipe, so adjusted between iron disks that, after being put down, they can be screwed together, and so caused to expand laterally, and completely fill the bore.

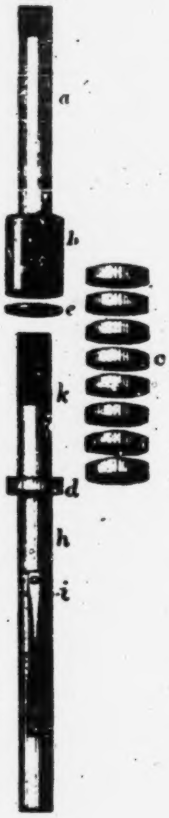


Fig. 26.

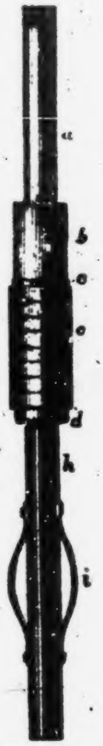


Fig. 27.

FIG. 26.—Rubber packing, shown apart; *a*, section of delivery tube, extending to the surface; *b*, a large thimble into which *k* screws; *e* an iron washer; *c*, a set of rubber disks, fitting on *k*, between *b* and *d*; *k*, a section of pipe on which is turned a long screw fitting in the thimble *b*; *d*, a disk forming the head of the screw *k*; *h*, a section of pipe extending about two feet below the packing; *i*, a spring to press against the walls and hold the pipe *h*, while the section *a* and thimble *b* are screwed upon *k*.

FIG. 27.—Rubber packing, shown screwed together as it is in the well.

The construction of the parts and their adjustment are sufficiently indicated in the accompanying figures, which illustrate one of the forms in use.

In a form employed in the oil regions, the expansion of the rubber disks, or single cylindrical one, is accomplished by pressing a conical hollow wedge between the pipe and the rings, thus forcing them out against the walls of the well.

In this case the packing is supported by a perforated tube, an "anchor," reaching to the bottom of the well. As the packing in artesian wells is often located near the top, the necessity for support from below excludes this form in most cases.[9]

[9] This form is described and figured by Mr. Carl, Second Geol. Surv. Penn., Rep. on Oil Regions, III, 1880, p. 322.

HEIGHT OF FLOW.

1. *Measurement.*—When the flow has been confined to the tube by either of the above devices, it is an easy matter to determine the available height to which it may be carried. Where the pressure is moderate, this is easiest determined by adding pipe above the surface until the water no longer rises through it. But when the pressure is great, it would ascend to an inconvenient height, and a pressure gauge of any available form may be substituted, and the height to which the water would rise, if suitably tubed, computed; each pound of pressure per square inch equaling 2.31 feet of rise.

2. *Prognostic estimate.*—The testing of the full strength of a generous fountain, already secured, is a comforting task, quite in contrast to the solicitude one suffers in attempting to estimate beforehand what height may be anticipated. Theoretically, the water will rise at the well to the same height as the fountain-head, and will flow at any elevation less than that. But the leakage of the confining strata and of the well reduce the height to which the water will rise, while the friction suffered in the long passage through the rock and the well will further lessen the altitude at which flow, of any notable vigor, will take place. Deduction must be made for all these elements. The special conditions which affect the estimate have been previously considered.[10] All the light that can be drawn from a careful scrutiny of these is demanded. The prudent expert will, however, seek assiduously a better and more truly scientific basis for his judgment. In almost every district wells have been attempted, and their results—whether successful or otherwise—if critically analyzed and interpreted, give valuable data, even though somewhat removed from the locality under consideration. The importance of recording and preserving the precise results of all enterprises, whether good or ill, cannot be too strongly urged upon drillers, geologists, and citizens alike, nor is it, perhaps, out of place here to urge that an intelligent respect be paid to the facts so developed; the respect, however, is no more important than the intelligence.

DETECTION OF FLOW.

It has been remarked above that the water may rise from the bottom to some higher portion of the well, and there find escape by passing off laterally through the upper strata. In the absence of control, the water does not always rise and overflow. It is a matter of some practical moment, therefore, to know when a stream is struck which may yield a flow at the surface when put under proper control. (1.)

[10] These conditions are so varied that I doubt the propriety of attempting any general statement of the deduction to be made from theoretical height. For Southern Wisconsin, I have found an allowance of about 1 foot for every mile between the collecting area and the site of the well to be as near a general estimate as I feel prepared to make; but even this is subject to considerable modification in special situations, and could not safely be adopted for other regions.

Such a stream usually discovers itself by a rise of water in the well, but this is not always the case. (2.) Some influence on the action of the drill is liable to be felt, which may arouse suspicion. (3.) In any instance of a strong flow, the drillings are apt to be carried away, so that when the sand-pump fails to bring these up, or brings only coarser material, there is good reason to believe that a stream has been struck, and the proper tests should be made. In enterprises that do not require a voluminous flow, tests should usually be made when such indications appear. It is ordinarily desirable to test the capacity of any stratum which gives any of these or other indications before sinking to a lower one. It is advisable to make provision in the contract for such tests, since it is not always to the interest of the driller, once his machinery is set up and well at work, to stop at the more limited depth. The capabilities of the flow may be tested by the use of a tube and seed-bag, or by rubber packing, as explained above.

Negative and false tests.—1. It is possible, in perfect honesty, to make both a negative and a false test. Suppose that two porous beds, A and B (Fig. 28), separated by an impervious layer, are traversed, and the testing of the first has been neglected, either because it failed to give encouraging indications or for other reasons. It is now desired to test these. Suppose the seed-bag or rubber packing be placed above the upper one. Now, if both bear a water-level equally high, the test will be fairly made, and the result will indicate their combined capacity; or, if both heads are at least as high as the surface at the well, the test may be accepted. But suppose that the bed A has been cut into by erosion, or been reached by crevices, or is otherwise defective, while the other, B, remains intact and bears an elevated fountain-head. Under these conditions the water may flow from B through the bore into A, and escape laterally through it, as illustrated in the figure. Now, in this case the result may be either simply negative or positively false and misleading. If the lateral leakage through the stratum A effectually disposed of the flow from B, and there was no leakage in the upper portion of the well, the water in the test-tube would stand during the test at essentially the same height as before, and the result would be negative, merely failing to indicate a possibility that really existed. If, on the other hand, there was lateral leakage through the upper strata as well as through A, neither alone being quite competent to dispose of the flow from B, then the introduction of the test pipe would cut off the upper leakage, leaving the bed A unable to dispose of the entire flow. In this case there would be a rise of water in the tube, and, possibly, a flow. The mischievousness of a test of this sort lies in the fact that it

FIG. 28.—Section of a well illustrating a negative test.

appears to be a true test, because it shows some result, while in reality it is false and misleading. The true test in this case can only be made by placing the packing between the porous beds A and B.

2. Take another instance where two porous beds, as A and B, figure 29, have been traversed. Let the packing be placed between these. Then (1), if A equals B in productive capacity, water will stand at the same height within and without the test-pipe *if there is no leakage in the upper beds*. (2) If the failure to flow was due to such leakage, then a flow will result from B, but the additional flow which might be secured from A is lost (see figure). (3) If A has a greater head than B, and if there is no loss above, the water in the test-pipe will actually be lower than that outside, as illustrated in figure 30. This may be said to be an *inverted test*, and is less misleading than the false and negative tests, since it plainly indicates an error of manipulation. I have known such a case of reduced head as the result of an attempted test. (4) If, however, there is in this case considerable lateral waste in the upper strata, the valuable flow from A will be lost, just as before the test was made, while B may give a rise in the tube, or even a flow, which would foster the impression that a fair test had been made, while in reality the greater flow has been lost. (5) If A gives a feebler flow than B, but has an equal head, the test will fail of being completely satisfactory only in excluding the feebler flow from A. (6) If, however, A has a lower head, and is a possible means of escape for the flowage from B, then the packing has been placed at the right point, and the test gives the best results.

FIG. 29.—Section of a well showing a partial and misleading test.

3. In still another case let A and B represent porous beds (figure 31), the lower of which is so conditioned as to drain the upper one by virtue of a lower outcrop, in the manner previously explained and illustrated in figures 13 and 14. (1) First, if the drainage-loss below is not complete, and if the packing is placed above A, as shown in figure 31, I, the result will be negative, if there is no leakage in the upper strata. (2) Should there be considerable loss there it will be cut off by the tube and packing, and some rise in the tube will be the result in most cases. In either instance the result is misleading, particularly in the last, because the small

FIG. 30.—Section of a well illustrating an inverted test.

rise of the water is apt to allay any suspicion as to the effectiveness of the test. The real fact, however, remains that the flow from the productive stratum is mainly lost below. (3) Suppose that the packing is located between A and B, as in figure 31, II, it will then shut off the flow from A, while that in B, because of a lower outlet, will fail to flow. Now, if there is opportunity for lateral leakage in the upper strata the water from A will rise in the well *outside* of the test-pipe and pass off into these open upper beds. (4) But if no such opportunity is afforded it may rise to the surface and overflow *outside* of the test-pipe, while the water within the test-pipe will probably be found to be lower than

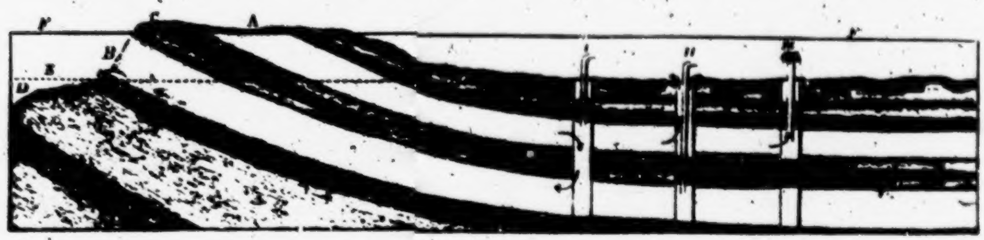


FIG. 31.—Section of strata and three wells, showing one correct and two erroneous tests. These wells are assumed to be independent of each other, and are placed together on the diagram merely for convenience.

before the test was made. The proper method of testing wells known or suspected to present these conditions is to sink a simple bag of seed or other obstruction to a point in the impervious stratum between A and B, which, when it tightens in its place, will shut off the flow below. Then a tube with packing sunk to a point above A will effectually cut off all leakage in the upper strata, and the full capacity of the water-bed A will be tested.

These examples, while not exhaustive of possible cases, illustrate the nature of defective tests and the deceptive conclusions liable to be drawn from them. The remedy is manifest. Test each water-bearing stratum as it is encountered, or else vary the final tests so as effectually to exclude all liabilities to error.

EFFECT OF TIME ON FLOW.

It is a common observation that the discharge of artesian wells declines in time, and the impression has somewhat obtained that this general fact is a necessary one. It is not unimportant, therefore, to consider the causes that lead to decline, since this is likely to be the best approach to the vital question, whether it is inevitable or preventable.

1. *Decline from loss of gaseous aid.*—We have thus far neglected a class of wells which flow, not from the pressure of an elevated fountain-head, but from the expansive force of pent-up gases, which are either disseminated throughout the water itself, like the carbonic acid in the soda fountain, or are contained in some hidden reservoir in communication with the water which is thus forced out. Wells of this class ejecting petroleum, gas, and water are familiar features of the oil regions.

447

March 14, 1933. M. O. JOHNSTON 1,901,813

OIL WELL TESTING DEVICE

Filed Sept. 7, 1932 2 Sheets-Sheet 1

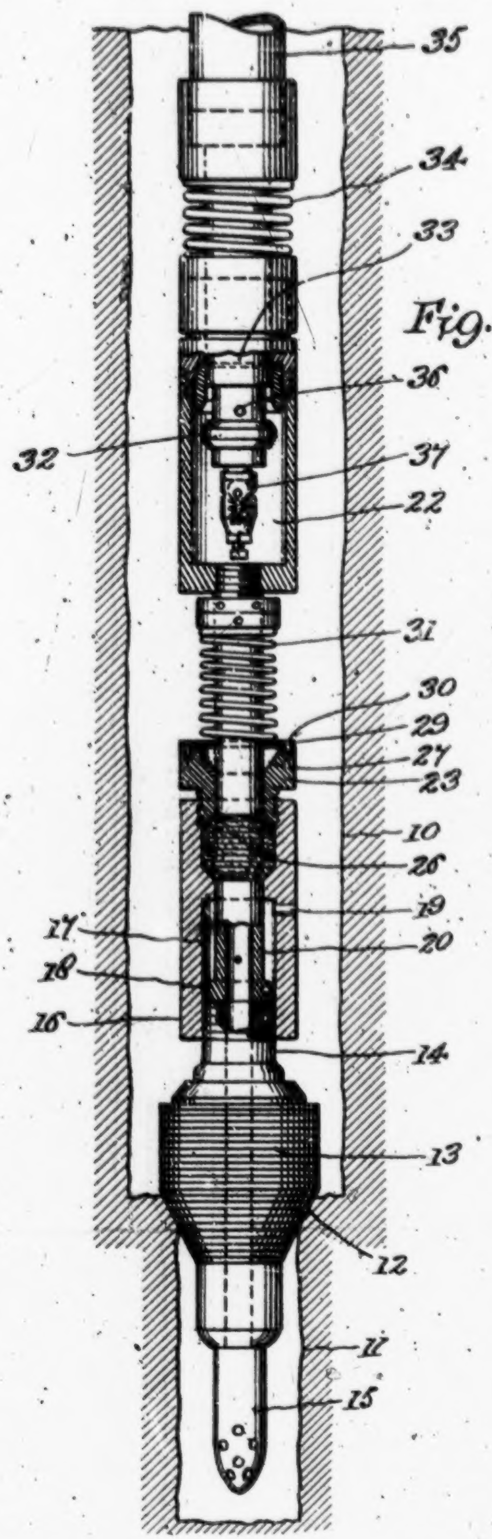


Fig. 1.

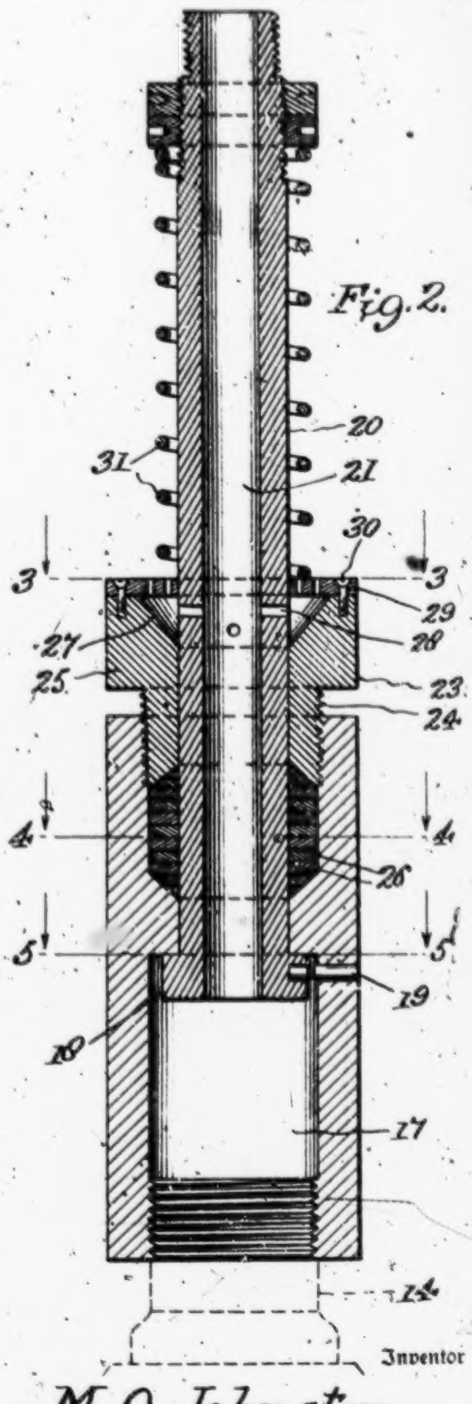


Fig. 2.

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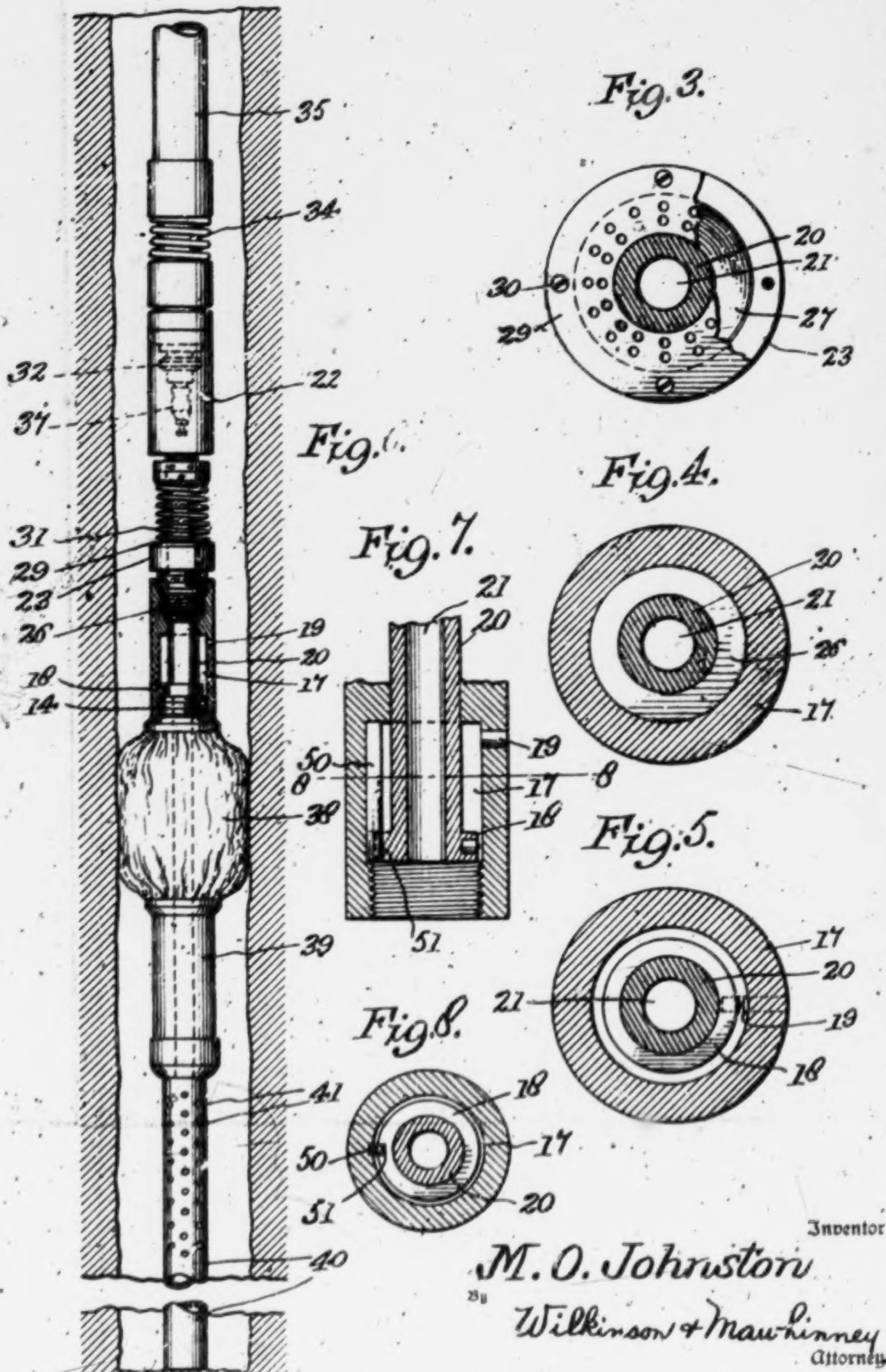
449

March 14, 1933. M. O. JOHNSTON 1,901,813

OIL WELL TESTING DEVICE

Filed Sept. 7, 1932 2 Sheets-Sheet 2



Inventor

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UNITED STATES PATENT OFFICE

NORDICA O. JOHNSTON, OF GLENDALE, CALIFORNIA, ASSIGNOR OF ONE-THIRD TO GILSON M. JONES AND ONE-THIRD TO FRANCIS C. VAN DEINSE, BOTH OF LOS ANGELES, CALIFORNIA

OIL WELL TESTING DEVICE

Application filed September 7, 1932. Serial No. 632,048.

The present invention relates to improvements in oil well testing devices. and has for an object to provide an improved testing device which may be used in all methods of testing, whether below the casing in rat holes. straight holes or inside the casing itself at various depths where it is desirous to determine the oil or other liquid encountered, and bring the same through the drill pipe. Furthermore it is intended for use to determine the effectiveness of a cement job on water shut off.

My invention is especially intended to provide certain improvements on the construction shown in my Patent No. 1,842,270, granted January 19, 1932, and entitled Oil well testing device.

With the foregoing and other objects in view, the invention will be more fully described hereinafter and will be more particularly pointed out in the claim appended hereto.

In the drawings where like symbols refer to like or corresponding parts throughout the several views.

Figure 1 is a front elevational view with parts broken away showing a rat hole in the bottom of the well with my improved valve in lowered position and the other associated parts connected thereto.

Figure 2 is an enlarged central vertical section showing my improved valve in raised position.

Figure 3 is a horizontal section taken along the line 3—3 in Figure 2.

Figure 4 is a horizontal section taken along the line 4—4 in Figure 2.

Figure 5 is a horizontal section taken along the line 5—5 in Figure 2.

Figure 6 is a view showing my improved valve applicable for use with straight hole testing devices.

Figure 7 is a fragmentary central vertical section showing my improved valve in lowered position and engaging a key guideway affixed to the housing, and

Figure 8 is a horizontal section taken along the line 8—8 in Figure 7.

Referring more particularly to the drawings, I have shown in Figure 1 by the numeral 10 the walls of the well bore, and having a conventional illustration of a rat hole 11 in the bottom of the well. The upper edge of the rat hole 11 is preferably shouldered at 12 to provide a seat for the packer 13 which has its lower portion tapered to project downwardly into the rat hole 11. The packer 13 has the hollow mandrel 14 alined centrally and vertically therethrough to register with the bull plug 15 at its lower end. and to connect with the valve housing 16 at its upper end.

The valve housing 16 has its lower portion cut internally to form an elongated cylindrical chamber 17 to receive the piston head 18, and allow the same to slide freely therein. Referring more particularly to Figure 2, the head 18 is shown held in the upper portion of the chamber 17 by a shear pin 19, which engages the head 18 and is passed through the housing 16. The head 18 presents a flat upper surface to engage the top wall of the chamber 17 and likewise a flat lower surface to seat upon the mandrel 14 when the parts are operated as disclosed in Figure 1. The elongated sleeve 20 projecting upwardly from the head 18 and slidable therewith may be made integral or attached to the same. A central passageway 21 extending therethrough provides direct communication between the chamber 17 and the upper valve chamber 22.

The elongated sleeve 20 is held in proper alinement with the housing 16, and permits sliding movement of the same by the stuffing box 23, which comprises the lower reduced portion or neck 24, and the upper enlarged head portion 25. The neck 24 is screw threaded exteriorly to engage the threaded opening in the top of the housing 16, and compress the packing rings 26 below the same tightly around the sleeve 20. The head 25 is cut downwardly about the central portion of its top surface in an angular direction to form a circular recess as shown by the numeral 27. This provides a space to register with the ports 28, which are cut transversely through the sleeve 20 into and connect with the central passageway 21 when the piston head is in raised position. The

perforated plate 29 is readily secured on the top of the head 25, which forms a part of the stuffing box gland 23, by screws or other fastening means 30, and allows the sleeve 20 to slide freely therethrough.

The perforations in this plate 29 permit communication between the recess 27 and the well bore 10. It is obvious when the ports 28 are in raised position as shown in Figure 2, the perforated plate 29 will always allow the fluid or other liquids to pass therethrough in a straight vertical path with the line of well boring 10. This perforated plate 29 also acts to exclude particles of dirt which might enter and tend to clog the ports 28 in the operation of the device.

A suitable coil spring 31 is properly adjusted between the plate 29 and the nuts 32 for normally holding the valve 18 and the elongated sleeve 20 in raised position. The chamber 22 as shown houses the trap valve 32 secured to the hollow stem 33 for vertical sliding movement, and as explained in my Patent No. 1,842,270 granted January 19, 1932, the trap valve is initially held seated in closed position by the coil spring 34 when the parts are attached to the well pipe 35 and the same are lowered into the well bore 10. The port holes 36 formed in the hollow stem 33 above the trap valve 32 are normally closed when the same is seated and are likewise opened with the valve 32 to give communication through the chamber 22 to the well pipe 35. Upon the lower end of the stem 33 is advantageously placed a circulating ball or other form of valve 37 that may be operated from the surface to force water through the pipe 35 to cleanse the interior parts in case mud or other foreign matter should cause these parts to become choked.

In Figure 6 I have shown my improved valve applicable where it is desirous to use the same with a device for straight hole testing. The numeral 38 represents a rubber sleeve expanding packer which can pass freely down the well bore 10 along with the other parts, but may be readily forced outwardly against the walls of the bore 10 when the desired depth is reached under the overhead weight of the well pipe 35.

This causes the lower portion of the well bore 10 below the packer 38 to be shut off and sealed from the upper portion. In order to make the test at the desired depth below the packer, a hollow sleeve 39 is attached to the lower portion of the projecting hollow mandrel 14 carried by the packer. The hollow sleeve 39 has secured thereto the elongated pipe or anchor 40 which is preferably of a reduced size in cross section, and extends to the bottom of the well bore 10. Suitable perforations 41 are made in the pipe 40 at the desired distance from the bottom of the well bore where it is desirous of making the test. The construction and arrangement of the parts above the packer are similar to those placed in the same position already described in Figure 1.

In the operation of the device and referring more particularly to Figures 1 to 5, the parts are readily attached to the well pipe 35, and then lowered into the well bore 10. The improved valve 19 during this initial step will be held in raised position as shown in Figure 2 and the trap valve 32 will be seated or in closed position. With the parts in this position the mud and fluid encountered will cause very little back pressure since the same can readily enter the perforated bull plug 15 and pass in a straight upward path through the valve and elongated sleeve 20.

The ports 28 provide outlets to the space directly beneath the plate 29, and the liquid is then passed upwardly through the perforations provided therein, to the well bore 10. It is readily appreciated the plate 29 with its small outlet perforations is advantageously placed to give protection to the ports 28 and prevent the same from becoming clogged from foreign matter that is encountered in well cavities.

When the device reaches the bottom of the well the parts will then assume the position for operation shown in Figure 1. Upon the entrance of the bull plug 15 into the rat hole 11, the packer 13 will rest or seat firmly upon the shoulder 12, at which time the weight of the well pipe 35 will compress spring 34 and force the trap valve 32 downwardly to open position. These parts will continue to move downwardly in this position, and because of their weight will break the shear pin [illegible] and release the piston head 18 whereby the same will be forced downwardly to seat on the hollow mandrel 14. Since the ports 28 are also moved downwardly they will become masked or closed by the packing [illegible]. The fluid or other liquid contents in the rat hole 11 upon entering the perforated bull plug 15 will be allowed to flow in a direct and vertical path into the chamber 22, and thence past the valve 32 through the port holes 36 into the well pipe 35.

Upon raising the pipe 35, it is obvious the trap valve 32 will be closed and prevent the escape of any fluid that has been entrapped above the same and may be brought to the surface as a sample for testing. Since the valve 18 will be lifted into raised position, the liquid in the well can readily enter the perforated plate 28 and escape through the bull plug, thus tending to ease the lifting of the device.

The placing of the ports 28 in the elongated sleeve 20 as shown, where they are not directly exposed at any time with the foreign matter encountered in wells and tending to clog or choke the same has provided greatly

to improved efficiency in a valve for making tests of this type.

Furthermore the present construction of valve housing provides for placing a packing 26 around the lower portion of the hollow sleeve 20. and thus gives a tight and more successful means of preventing the escape of the fluid passing therethrough or the intrusion of foreign matter from this point when the parts become slightly worn after operating a long time.

In Figure 6, where the parts are assembled for straight hole testing, an expanding packer 38 is used which initially will be of a size to slide freely down into the well bore 10. Assuming the trap valve 32 closed and the improved valve 18 in raised position, the packer 38 carrying the pipe or anchor 40 is attached to the well pipe 35, and lowered into the well bore 10.

The mud and fluid will be allowed to pass through the pipe 40. and out the perforations in the plate 29. and thus relieve or retard any backward pressure encountered. When the pipe or anchor 40 rests upon the bottom of the well, the weight of the well pipe 35 will force the opening of the trap valve, and then in turn close the valve 18. During this action the overhead weight pressing downwardly upon the packer 38 will necessarily cause the same to expand or bulge outwardly against the walls of the well, and thus seal the lower portion of the same. The fluid entrapped below the packer and at a height from the bottom of the well to register with the perforations 41 will thus be enabled to pass upwardly into the well pipe as previously described.

I have shown in Figures 7 and 8 means whereby I may facilitate the proper placing of the valve 18 for the ready insertion of the shear pin 19 when the valve is in raised position. This construction also permits the rotation of the entire tool, whenever desired. This always is necessary when using casing-packer method of testing inside casing that drill pipe may be turned to disengage slips that anchor packer to side walls of casing. It also often is necessary to rotate entire tool in our straight-hole and rat-hole methods of testing.

In accomplishing this feature a key 50 is affixed to the interior wall of the chamber 17 and forms a vertical guideway. The valve head 18 is provided with a notch or groove 51 to engage the key. Thus the valve head is restricted to move over the same path in either an upward or downward direction as may be desired in the proper positioning of the valve.

This valve construction can be readily applied to various types of testing tools now used and attain the satisfactory and highly efficient results as already described.

It will be noted that the device is useful not only in open-hole testing and in shoulder testing, but also in casing-packer testing.

What we wish to cover is the use of valve in all methods of testing whether below casing in rat-hole or straight-hole or inside the casing itself.

It is obvious that various changes in the construction, combination and arrangement of parts could be made, which could be used without departing from the spirit of my invention, and I do not mean to limit the invention to such details, except as particularly pointed out in the claim.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

In a well testing device provided with a packer, adapted to be used in a well cavity, a valve housing rigidly attached above the packer, a valve comprising a piston head and an elongated sleeve having a central passageway therethrough mounted to slide in the housing, open ports cut through the elongated sleeve to connect with the central passageway, a packing carried in said housing to encase the lower portion of the elongated sleeve, and mask said ports when the piston head is moved downwardly, a compression gland secured to said housing whereby to compress the packing and permit movement of the elongated sleeve, the said gland having a recess cut therein to register with the ports when the piston head is moved upwardly, a perforated plate secured to the top of the gland whereby to permit communication between the recess and the well cavity and allow movement of the sleeve therethrough, and means for engaging the perforated plate and said elongated sleeve to return the piston head to raised position.

MORDICA O. JOHNSTON.

Jan. 19, 1932. M. O. JOHNSTON 1,842,270

OIL WELL TESTING DEVICE

Filed June 19, 1931 2 Sheets-Sheet 1

Fig. 1.

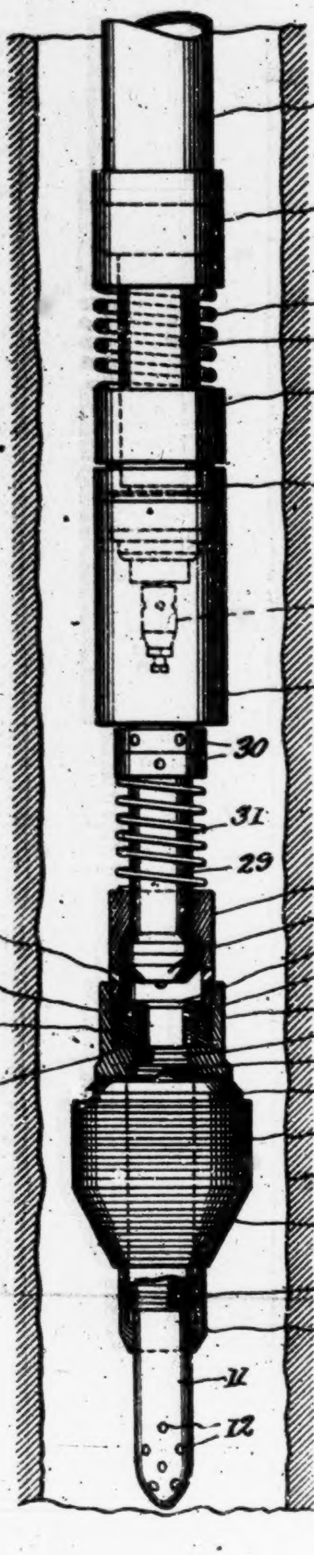
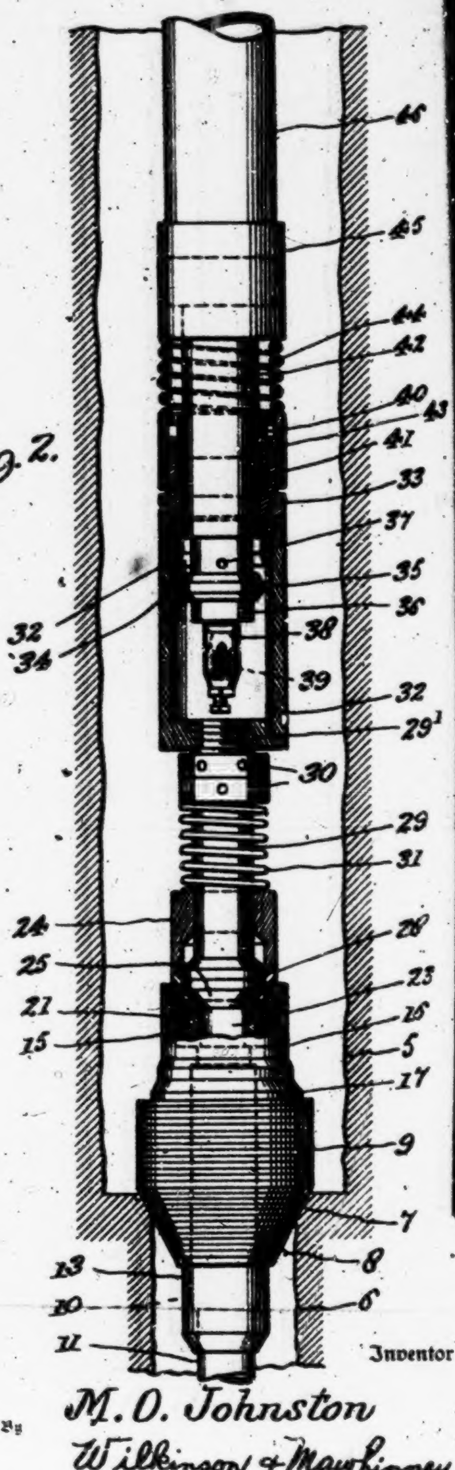


Fig. 2.



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OIL WELL TESTING DEVICE

Filed June 19, 1931 2 Sheets-Sheet 2

Fig. 3.

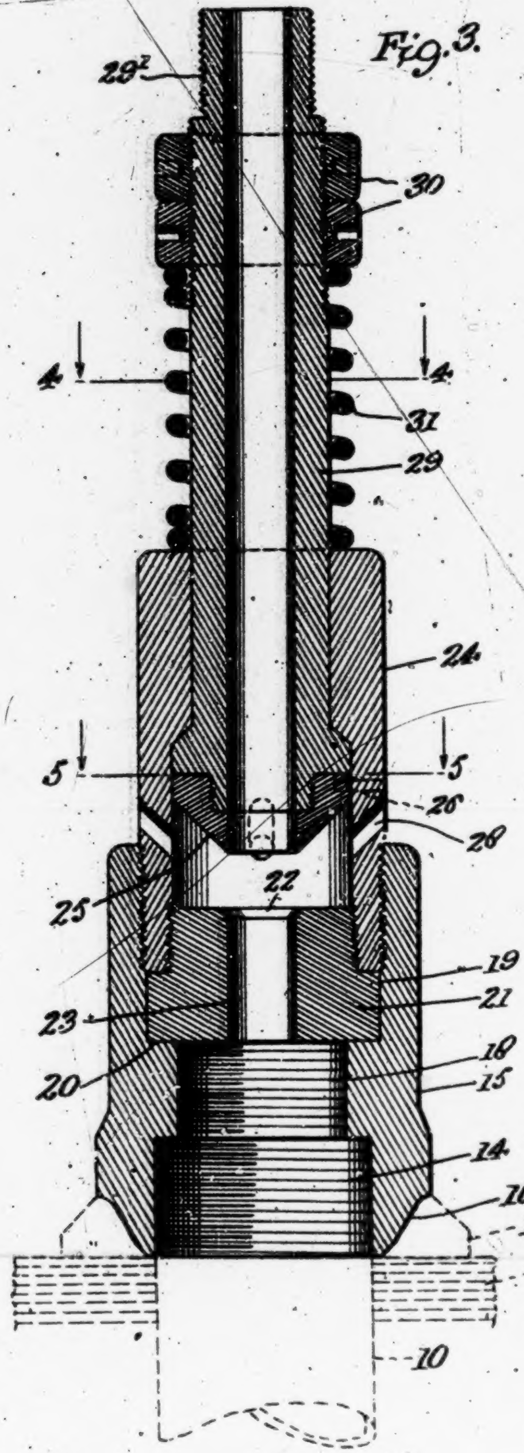


Fig. 4.

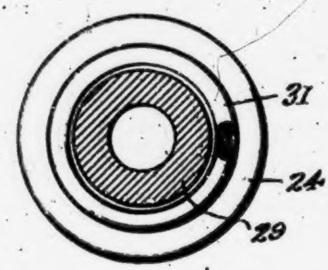


Fig. 5.

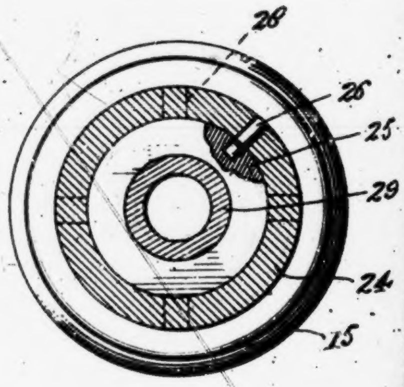
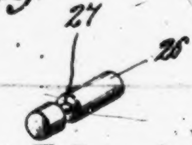


Fig. 6.



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Patented Jan. 19, 1932 1,842,270

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OIL WELL TESTING DEVICE

Application filed June 19, 1931. Serial No. 545,576.

The present invention relates to improvements in well testing devices, and has for an object to provide an improved testing device in which samples of oil, or other liquid, may be taken from the bottom of the well and brought up through the drill pipe.

It is an object of the present invention to provide a device that can be more readily released after the packer has reached the rathole, and the test completed without putting the lifting strain on the drill pipe by placing above the packer a valve that can be moved in its housing to expose ports and thus allow the free flow of mud from the well cavity above the packer through the ports into the device and out the bull plug whereby to equalize pressure.

Another object of the invention is to provide a device which can be easily inserted into a well cavity where the packer more nearly approaches the size of the hole by keeping the valve in raised position where it will allow the ports in the valve housing to remain open, and thus permit the fluid to more readily pass through the device from below the packer and thence out the ports above the same.

A further object of the invention resides in a device that will permit the packer to be washed free when the same may become stuck by allowing the valve to remain open and water pumped under pressure through the drill pipe past the valve and out the ports on to the top of the packer.

It is still a further object of the invention to provide a device where the valve parts can be made to produce a jarring action when desirable to loosen the packer from its seat.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings where like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a front elevational view with parts broken away of my well testing device with my improved valve in raised position.

Figure 2 is a similar view showing my improved valve in lowered position.

Figure 3 is an enlarged central vertical sectional view of my improved valve in raised position.

Figure 4 is a horizontal section taken along the line 4—4 in Figure 3.

Figure 5 is a horizontal section taken along the line 5—5 in Figure 3, and

Figure 6 is a perspective view of one form of shearing pin to hold the valve in raised position.

Referring more particularly to the drawings, the numeral 5 indicates the well generally, and 6 is a conventional showing of a rathole in the bottom of the well, resulting in the shoulder 7 against which the lower bevel portion 8 of the packer 9 is adapted to engage. The packer extends exteriorly of the packer mandrel 10, the lower end of which carries the bull plug 11 provided with the perforations 12 through which the liquid can pass. The lower portion of the packer mandrel is screw threaded to receive the retaining nut 13 which extends up against the lower portion of the packer whereby to hold these parts in fixed relation. The upper portion of the packer mandrel projects beyond the top of the packer and is screw threaded along its upper outside portion to engage corresponding threads cut in the lower inside opening 14 of the head 15 whereby these members are held firmly together in alignment.

The head 15 comprises substantially a hollow cylinder of outside uniform diameter over its greater length with a lower enlarged portion cut inwardly at an angle 16 to seat and hold the ring 17 cut at a corresponding angle to engage the lower portion of the head and also provide a flat base to rest upon the top ring of the packer whereby the packer rings can be properly clamped together when the retaining nut 13 is screwed tight. The head is provided with a smaller screw threaded opening 16 in alignment with the screw threaded opening 14 and terminating at a point preferably midway of the inside of the head to allow for the insertion of tools of a lesser diameter.

The upper cylindrical portion of the head is bored to form an opening 19 of greater diameter than the opening 18 and extended down to a point to communicate with the smaller opening, thereby producing a shoulder 20 to engage and house the ring 21 formed with the valve seat 22 terminating in the central opening 23 and having an outer portion cut away and screw threaded to receive the lower inside screw threaded end of the valve housing 24.

The opening 19 in the head is also screw threaded to receive the screw threads on the lower outer portion of the valve housing and thereby hold these parts rigid. The valve housing is internally bored to provide a chamber wherein the valve 25 is normally held in the upper position shown in Figure 1 by a pin 26 with the weakened portion 27 being inserted through the wall of the valve housing and into a socket in the valve. It is to be understood any form of frangible pin may be used and I do not mean to limit myself to any particular design of such pins. The valve in this position is spaced from its valve seat 22 and also exposes the downwardly inclined outlets 28 in the valve housing, thereby allowing mud or fluid to pass from the well cavity through the outlets, down the central opening in the ring 21 and thence seek outlet through the perforated bull plug.

The valve 25 is bored centrally to provide a passageway and register with the elongated opening in the hollow valve stem 29 that has its lower end externally screw threaded to engage the internal screw threaded portion of the valve, thereby holding the valve and valve stem together. The valve stem passes through the valve housing and extends upward beyond the same and carries the adjusting nuts 30 to engage the screw threaded portion closely placed to the upper end of the valve stem. A coil spring 31 is mounted upon the valve stem with its lower end engaging the top of the valve housing, and with its upper end in contact with the adjusting nut 30, whereby to normally hold the spring in expanded position and the valve in raised position disclosed in Figure 1 and Figure 3.

The end 29' of the valve stem is reduced slightly in size and screw threaded to firmly secure thereto the valve chamber 32 having its upper end internally threaded to engage the exterior threads on the stuffing box section 33. Within the stuffing box section is secured a section providing a trap valve seat 34 to engage the trap valve 35 secured to the hollow valve stem 36. The valve stem is provided with a series of radially extending ports 37 which lie above the valve and extend completely through the valve stem 36. Carried upon the lower end of the valve stem is a circulating ball or other form of valve 38 held against its seat upon the lower end of the valve stem by a spring 39.

The upper end of the stuffing box section 33 is interiorly screw threaded to receive the packing gland 40 to compress the gland 41 against the travelling stem 42. The lower end of the travelling stem carries the trap valve stem 36. The stuffing box section is also exteriorly threaded to receive the tension collar 43 which receives the lower end of the main spring 44. The upper end of the main spring seats against the lower end of the reducing collar 45, which latter supports the upper end of the travelling stem 42, the upper end of the travelling stem being screw threaded into the collar 45 or otherwise held firmly.

The pipe line 46 is screwed or otherwise rigidly held in the collar 45.

In the operation of the device, the parts are assembled and lowered into the well cavity, as shown in Figure 1, with my improved valve in the raised position exposing the outlet openings 28 in the valve housing 24 and while so placed, the trap valve 35 and circulating valve 38 are closed. Where the well cavity closely approaches the size of the packer and mud or fluid are encountered, the lowering of the device will be greatly improved from back pressure caused by mud or fluid below the packer since they can pass into the perforated bull plug 11, through the mandrel 10 into the valve housing 24 and escape through the outlets 28 placed above the packer communicating with the well cavity 5.

When the device reaches the bottom of the well, the parts assume the position shown in Figure 2. The bull plug enters the rathole and the packer 9 will seat upon the shoulder 7, at which time the weight of the drill pipe 46 compresses the spring 44 and opens the trap valve 35 in the valve casing 32. These parts will continue to move downward in this position since their weight will cause the shearing of the pin 26, whereby to release the valve 25 compress the spring 31 and force the same down on its seat 22. In the lowered position, the valve 25 closes the outlets 28 communicating with the well cavity and with the parts so positioned the fluid to be sampled can enter the bull plug 11, and be carried past the valve 25 through the trap valve 35 and thence through the drill pipe.

The valve 25 and its housing 24 having outlets 28 are located above the packer 9 and below the valve chamber 32 in which is housed the trap valve 35 and circulating valve 38. The location of the parts in this position aids in the lowering of the improved device into a well cavity since the mud and fluid below the packer that cause back pressure upon the same can readily pass into the bull plug 11, below the packer, and thence through the outlets 28 above the

packer into the well cavity and thus afford a means of equalizing the pressure.

It will allow the valve 25, when the device has reached the bottom of the well and the packer 9 has seated, to close the outlets 28 and open the trap valve 35 whereby the fluid sealed in the rathole 6 can be carried up through the trap valve without interference from the fluid or mud contained in the well cavity 5.

A feature of the invention is that the valve 25 when in the raised position to expose the outlets 28 and the packer becomes stuck, it will allow water under pressure to be forced down the drill pipe 46 through the circulating valve 38 and thence through the outlets 28 on to the top of the packer, whereby to wash the same free and allow free movement.

A further feature of the invention is the location of the spring 31 upon the valve stem 29 above the valve housing 24 to return the valve 25 immediately to raised position when the weight of the drill pipe has been removed in lifting. This action closes the trap valve 35 to retain the sample fluid carried up past the same and also opens the outlets 28, thereby allowing the mud to pass therethrough and out the bull plug into the rathole and thus prevent lifting strain to be put upon the device.

With the valve 25 and the other parts of the device arranged as shown, it will be possible to jar the packer loose when struck by a slight raising and releasing of the drill pipe.

While I have shown the lower end of the valve housing 24 adapted to screw inside of the head 15, it may be preferable to reverse this form of connecting these parts and permit the valve head 24 to screw outside the head 15. It is also to be noted that while I have shown my improved valve as applied to but a single type of well testing devices, it is obvious I may readily attach and use the same with any type of testing devices.

It is obvious that various changes in the construction, combination and arrangement of parts conld be made, which could be used without departing from the spirit of my invention, and I do not mean to limit the invention to such details, except as particularly pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. In a well testing device provided with a packer adapted to be used in a well cavity, a valve housing rigidly mounted above the packer with outlets communicating with the well cavity, and a movable valve carried in the housing whereby to open and close said outlets.

2. In a well testing device provided with a packer adapted to be used in a well cavity, a valve housing rigidly mounted above the packer with outlets communicating with the well cavity, a valve normally held in the housing to expose the outlets therein to communicate with the well cavity, and means for releasing said valve to move and close said outlets.

3. In a well testing device provided with a packer adapted to be used in a well cavity, a valve housing rigidly mounted above the packer with outlets communicating with the well cavity, a valve seat provided with an opening fixed in the lower end of the housing to form a central passageway, a valve normally held spaced from the valve seat to expose the central passageway and the outlets communicating with the well cavity, and means for releasing said valve whereby to move and close said outlets.

4. In a well testing device provided with a packer to be used in a well cavity, a valve housing rigidly mounted above the packer with outlets communicating with the well cavity, a valve seat with a central opening fixed in the housing, a valve provided with a travelling stem, normally held spaced from the valve seat to expose the outlets communicating with the well cavity, means for releasing the valve and travelling stem whereby to close the communicating outlets, and a spring carried by the travelling stem positioned to be compressed when the valve is closed and to restore the parts to normal position when the release means are removed.

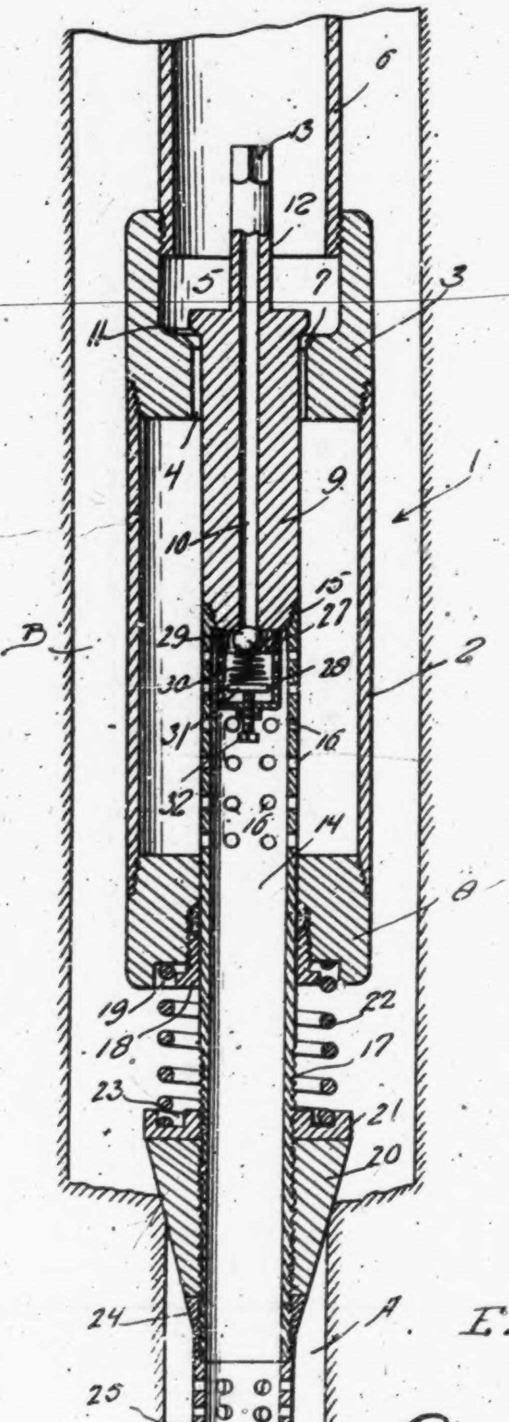
5. In a well testing device provided with a packer to be used in a well cavity, a mandrel to support the packer, a valve housing above the packer having a valve seat mounted therein and provided with outlets to the well cavity, a substantially cylindrical head for engaging the mandrel and the valve housing whereby to hold these parts in fixed relation a valve seat fixed in the housing, a valve with a travelling stem normally held spaced from the valve seat to expose the outlets communicating with the well cavity, a second valve housing carried by the drill pipe and attached to the travelling stem, the valve and travelling stem positioned to receive the weight of the drill pipe and close the communicating outlets, and a spring carried on the travelling stem positioned to be compressed when the valve is closed and for returning the valve to normal position when the drill pipe is raised.

MORDICA O. JOHNSTON.

23, 1929. E. C. JOHNSTON 1,709,940

WELL FORMATION TESTING DEVICE

Filed March 23, 1927



Inventor
E. C. Johnston,

By Clarence A. O'Brien
Attorney

Patented Apr. 23, 1929. **1,709,940**

UNITED STATES PATENT OFFICE.

EDGAR CLINTON JOHNSTON, OF EL DORADO, ARKANSAS, ASSIGNOR TO JOHNSTON FORMATION TESTING CORPORATION, OF EL DORADO, ARKANSAS, A CORPORATION OF DELAWARE.

WELL-FORMATION-TESTING DEVICE.

Application filed March 23, 1927. Serial No. 177,719.

The present invention relates to improvements in testing devices for use in connection with formation and drilling oil wells and the like and has for its principal object to provide a simple and efficient means for accurately testing sands which are encountered during the drilling of the well.

One of the salient objects of the present invention is to provide a testing device of the above mentioned character which includes an automatically operated valve structure, which will at all times be positive and efficient in its operation.

In drilling a well where a likely formation is struck, the operator of the drilling mechanism or apparatus will reduce the size of the hole that is being drilled by the method commonly known or called "rat holing". This rat hole is formed by employing a bit of a smaller size than the one used to finish the hole.

One of the important objects of the present invention resides in the provision of a testing device, which may be readily and easily secured on the lower end of the drill pipe, the testing device including a perforated plug which is adapted to enter the rat hole, in order to permit any fluid or gas to enter the tester. A tapered packer is associated with the tester at a point above the perforated plug and this packer is adapted for cooperation with the upper portion of the rat hole for the purpose of preventing water and mud laden fluid from entering the rat hole and subsequently the perforated plug. Means are further associated with the tester for permitting the fluid to pass upwardly therethrough and enter the drilling pipe. A normally closed valve is arranged within the testing device, the same being opened by the weight of the tester and the pipe to which the device is attached, when the packer strikes the rat hole.

A further object of the invention is to provide an emergency relief arrangement by means of which, should the testing device become stuck in any part of the well bore, as by the crumbling in of the walls of the well, fluid pressure may be supplied below the tester, tending to facilitate the withdrawal upward of the drill tube and tester, without necessitating troublesome, expensive and often futile fishing operations.

A further object is to provide a device of the above mentioned character which is simple in construction, inexpensive, strong and durable and further well adapted to the purposes for which it is designed.

Other objects and advantages will become apparent during the course of the following description.

In the accompanying drawing, forming a part of this specification, and in which like numerals indicate like parts throughout the same:

The figure represents a vertical sectional view through the testing device embodying my invention, and showing the same in actual use, the valve being open.

In the drawing wherein for the purpose of illustration is shown the preferred embodiment of my invention, the numeral 1 designates generally the tester. The same comprises the cylindrical casing 2 which is internally threaded at its upper and lower ends. A bushing or fitting 3 is threaded at its lower end in the upper internally threaded end of the cylindrical casing 2 and the upper portion of the bushing has the bore 4 thereof enlarged to provide the socket 5. This socket is internally threaded at its upper end whereby the bushing or head may be threaded on the lower threaded end of the drill pipe 6. The valve seat 7 is formed at the juncture of the bushing 3 with the socket 5, and the purpose of this valve seat will be hereinafter more fully described.

A bushing or head 8 is threaded at its upper end in the lower internally threaded end of the cylindrical casing 2, thereby providing a unitary structure between the casing and the heads.

My improved tester further includes the provision of the stem 9, which is of a diameter slightly less than the diameter of the bore 4 of the bushing 3, and through which the stem extends. This stem is formed with a longitudinal bore 10. A valve 11 is formed at the upper end of the stem and is arranged within the socket 5 for cooperation with the valve seat 7. This valve is normally maintained in a closed position against the valve

seat by a suitable spring in the manner to be presently apparent. A tubular extension 12 is formed on the upper end of this stem 9 and this extension extends upwardly into the lower end of the pipe 6 as is shown in the drawing. The upper end of the extension is formed with a square shoulder 13 whereby the stem may be rotated for engagement with or disengagement from the pipe 14.

This pipe 14 extends through the bore of the lower bushing 8 and the upper portion of the pipe extends into the cylindrical casing 2 and is internally threaded at its upper end for detachable engagement with the lower threaded end of the stem 9. The connection 15 between the lower end of the stem 9 and the upper end of the pipe 14 will form a unitary structure.

The upper portion of this pipe is formed with a series of fluid outlet openings 16, and the lower end of this vertical pipe 14 is externally threaded as is clearly shown at 17 in the drawing.

A suitable packing gland 18 is threaded upwardly into the bore of the lower bushing 8 and the same surrounds the intermediate portion of the pipe 14. The bottom of the bushing 8 is formed with an enlarged cut out portion 19 to receive the tool engaging end of the gland 18.

A tapered rubber packer 20 is formed with a central bore and is adapted for disposition upon the lower threaded end of the pipe 14. A relatively thick plate formed with a central threaded opening is threaded on the threaded end portion 17 of the pipe 14 and engages the top of the tapered rubber packer 20 in the manner clearly shown in the drawing and this plate is designated by the numeral 21. A heavy expansible coil spring 22 encircles the threaded portion 17 of the pipe 14 and is disposed between the bushing 8 and the plate 21. The upper end of the spring encircles the tool engaging end of the packing gland 18 and is disposed within the cut out portion 19 formed in the bottom of the bushing 8. The lower end of this spring is disposed within an annular groove 23 formed in the top of the thick plate 21. The expansible spring 22 normally urges the casing 2 and the bushings carried thereby upwardly so that the seat 7 will be held against the valve 11, thus cutting off communication between the socket 5 and the cylindrical casing 2 as is readily obvious from the construction shown in the drawing.

A tapered collar 24 is formed with a central threaded bore for threaded engagement on the threaded end of the pipe 14 and the lower end of the tapered rubber packer 20 engages the upper face of this downwardly tapered collar and the collar provides means for preventing any possibility of the rubber packer 20 working downwardly on the lower end of the pipe 14.

Adapted for cooperation with the lower end of the pipe 14 is the perforated hollow plug 25, the lower end thereof being closed. However, the closed lower end of the hollow plug is also formed with a series of perforations or openings similar to the openings formed in the side of the plug, and these openings are shown at 26. The perforated plug is threaded on the lower threaded end 17 of the pipe 14 and the upper open end of the plug will engage the lower end of the downwardly tapered collar 24 in the manner as clearly shown in the drawing. A reduced externally threaded neck portion 27 is formed on the lower end of the stem 9, the same surrounding the bore 10. A cage 28 open at its upper end is threaded on this depending neck 27 and is arranged within the upper portion of the pipe 14. Confined within the cage 28 and adapted for cooperation with the lower end of the bore 10 formed in the stem 9 is the ball valve 29. An expansible spring 30 normally urges the ball valve 29 against the lower end of the bore 10 for closing the same and the tension of this coil spring is adjusted through the medium of a plate 31 slidable within the cage 28 and a bolt 32 is threaded through the bottom of the cage and engages the slidable plate 31 in the manner as clearly shown in the drawing.

The ball valve 29 will normally prevent any possibility of any fluid passing upwardly through the stem 9. The operation of my improved testing device may be briefly stated as follows:

After the rat hole A has been formed, the testing device is attached to the lower end of the drill pipe 6 and the same is lowered within the larger hole B, so that the lower end of the pipe 14 will enter the rat hole and the hollow perforated plug 25 will be enclosed therein. The tapered rubber packer 20 will engage the upper edge of the rat hole and thereby form a closure for preventing any possibility of water or mud laden fluid from entering the rat hole from above. Due to the weight of the cylindrical casing and its bushings as well as the drill pipe 6 to which the casing is secured, the latter will move downwardly on the pipe 14, against the tension of the coil spring 22, thus removing the valve seat from engagement with the valve and the fluid which enters the pipe 14 through the holes 26 in the perforated plug 25 will pass upwardly through the pipe and be discharged into the casing through the outlet openings 16. The fluid will then pass upwardly through the bore 4 around the stem 9 and will further pass outwardly through the drill pipe 6.

In using the present device, it may be found necessary to circulate the mud laden fluid in the hole B and to this end, the fluid is admitted through the tubular extension

12 formed on the stem 9 and the pressure of this fluid will unseat the valve 29 and the fluid will then pass downwardly through the pipe 14 into the perforated plug 25 and will then circulate upwardly around the tester. Thus, should the tester stick in the well at any part of the bore above the rat hole, caused for instance by the crumbling in of the side walls of the well, fluid under pressure may be pumped into the well below the tester, and an upward pressure created which would greately facilitate the lifting of the tester and the drill pipe attached thereto upwards to the surface, or as far up as may be desired.

When the device is in its lowermost position, the valve is open and manifestly when the device is lifted upwardly, the valve will be automatically moved to a closed position. The provision of a valve structure of this character will obviate the necessity of having to provide any additional means for actuating the valve such as is employed with certain types of testing devices now in use.

With a testing device of the above mentioned character, the various formations encountered in drilling operations may be tested in a simple and efficient manner. The simplicity with which my device is constructed enables the parts to be readily and easily assembled and attached to the lower end of a drill pipe, and the device will at all times be positive and efficient in carrying out the purposes for which it is designed.

While I have shown the preferred embodiment of my invention, it is to be understood that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention and the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:—

1. Apparatus for testing formations in oil wells, in which the well is provided with the usual bore and rat hole, comprising a drill tube projecting down into the well, a hollow cylindrical casing attached to the lower end of said drill tube, the upper head of said casing being provided with a valve seat and a bore beneath the same, and the lower head of said casing being provided with a stuffing box, a hollow valve stem carrying a valve, slidably mounted in said bore, a tube connected to the lower end of said valve stem and provided at its upper end with a series of perforations, said tube projecting down through said stuffing box, a perforated plug secured to the lower end of said tube and adapted to project down into the rat hole of the well, a packer mounted on said tube above said plug, a coil spring held under compression between said casing and said packer and normally adapted to hold said valve on its seat, and a spring impressed emergency valve located within said tube and normally closing the passage through said valve stem, but yielding to fluid pressure from above.

2. Apparatus for testing formations in oil wells, in which the well is provided with the usual bore and rat hole, comprising a drill tube projecting down into the well, a hollow cylindrical casing attached to the lower end of said drill tube, the upper head of said casing being provided with a valve seat and a bore beneath the same, and the lower head of said casing being provided with a stuffing box, a hollow valve stem carrying a valve, slidably mounted in said bore, a tube connected to the lower end of said valve stem and provided at its upper end with a series of perforations and at its lower end with external threads, said tube projecting down through said stuffing box, a perforated plug screwed on to the lower end of said tube and adapted to project down into the rat hole of the well, a tapered packer mounted on said tube above said plug, and adapted to engage in the upper portion of said rat hole, a coil spring held under compression between said casing and said packer and normally adapted to hold said valve on its seat, and a spring impressed emergency valve located within said tube and normally closing the passage through said valve stem, but yielding to fluid pressure from above.

3. Apparatus for testing formation in oil wells, in which the well is provided with the usual bore and rat hole, comprising a drill tube projecting down into the well, a hollow cylindrical casing attached to the lower end of said drill tube, the upper head of said casing being provided with a valve seat and a bore beneath the same, and the lower head of said casing being provided with a stuffing box, a hollow valve stem carrying a valve slidably mounted in said bore, a tube connected to the lower end of said valve stem and provided at its upper end with a series of perforations, said tube projecting down through said stuffing box, a perforated plug secured to the lower end of said tube and adapted to project down into the rat hole of the well, a packer mounted on said tube above said plug, and a coil spring held under compression between said casing and said packer and normally adapted to hold said valve on its seat.

4. Apparatus for testing formation in oil wells, in which the well is provided with the usual bore and rat hole, comprising a drill tube projecting down into the well, a hollow cylindrical casing attached to the lower end of said drill tube, the upper head of said casing being provided with a valve seat and a bore beneath the same, and the lower head of said casing being provided with a stuffing box, a hollow valve stem carrying a valve

slidably mounted in said bore, a tube connected to the lower end of said valve stem and provided at its upper end with a series of perforations and at its lower end with external threads, said tube projecting down through said stuffing box, a perforated plug screwed to the lower end of said tube and adapted to project down into the rat hole of the well, a tapered packer mounted on said tube above said plug, and a coil spring held under compression between said casing and said packer and normally adapted to hold said valve on its seat.

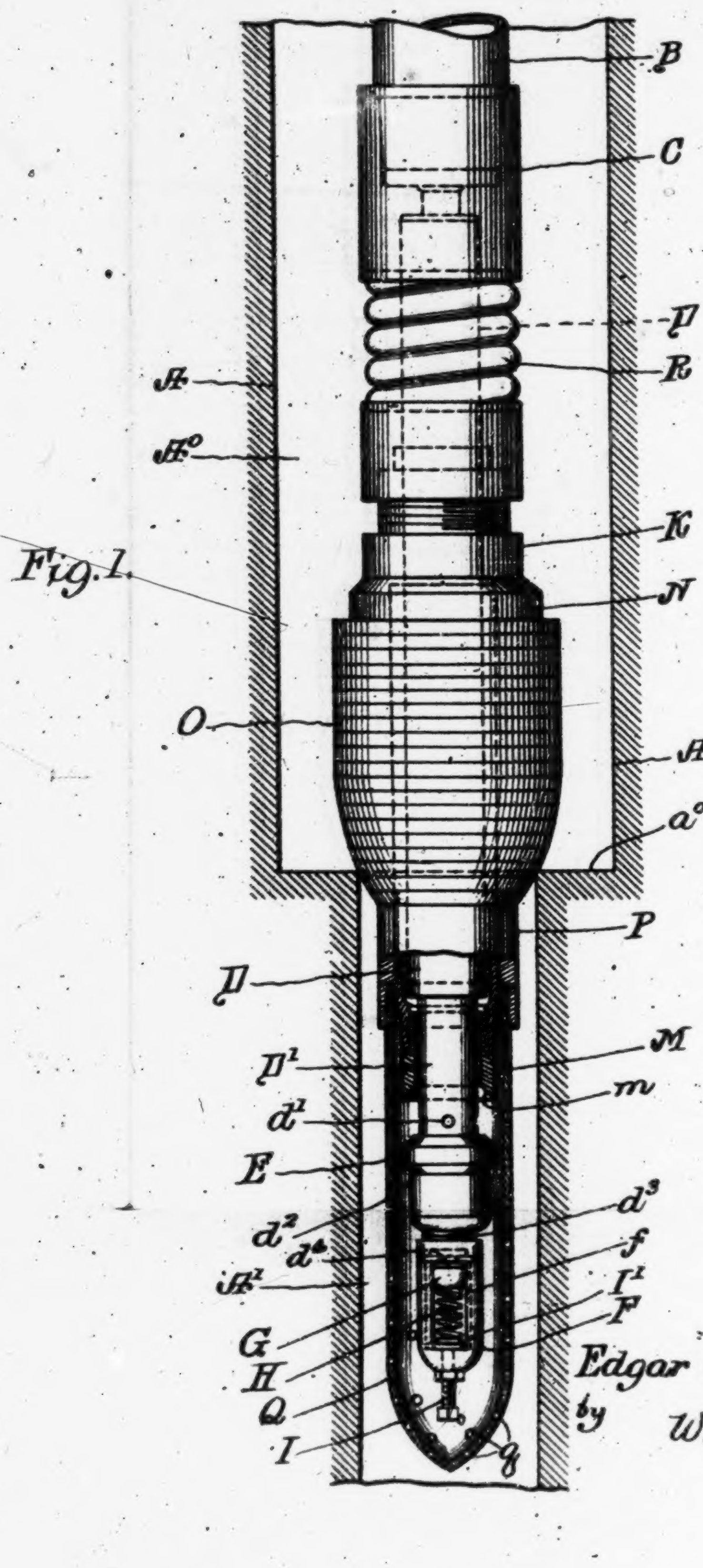
In testimony whereof I affix my signature.

EDGAR CLINTON JOHNSTON.

Jan. 27, 1931. E. C. JOHNSTON 1,790,424

TOOL FOR TESTING WELL FORMATIONS

Filed Sept. 25, 1929 2 Sheets-Sheet 1



Inventor

Edgar C. Johnston

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Attorneys.

Jan. 27, 1931. E. C. JOHNSTON 1,790,424

TOOL FOR TESTING WELL FORMATIONS

Filed Sept. 25, 1929 2 Sheets-Sheet 2

Fig. 2.

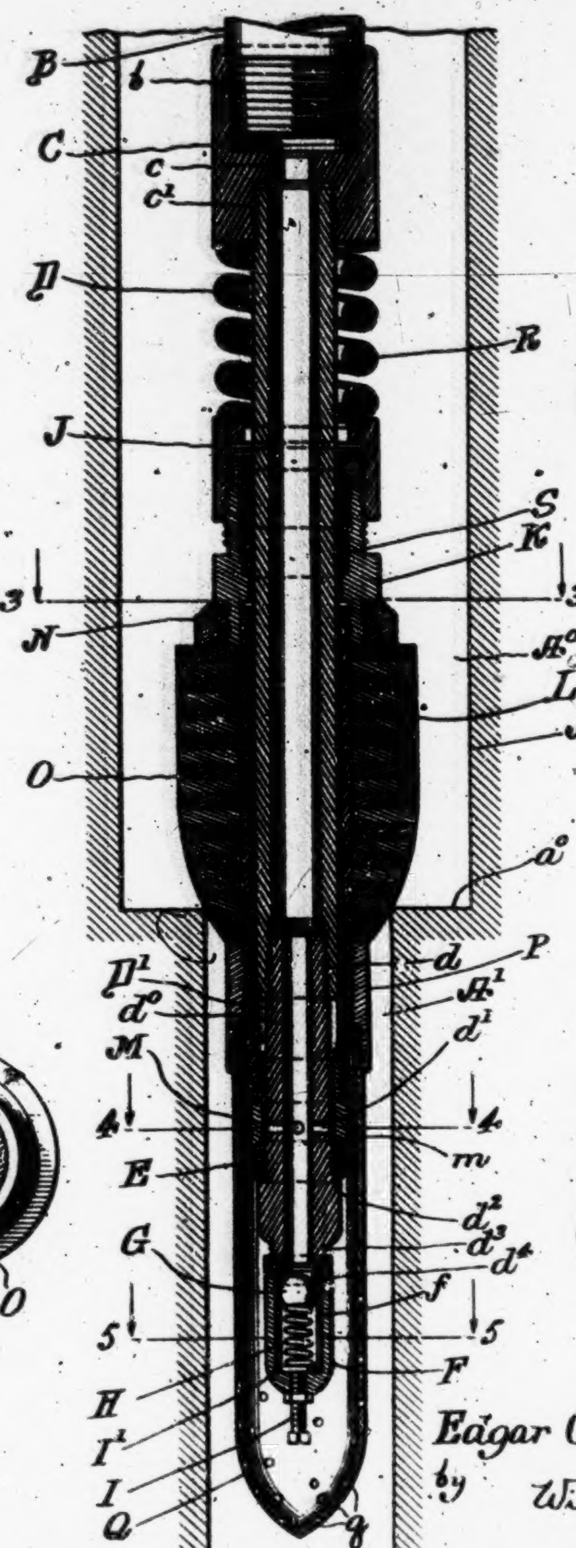


Fig. 4.

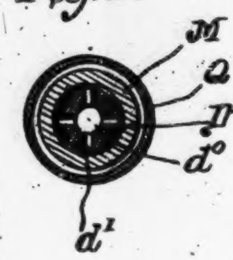


Fig. 3.

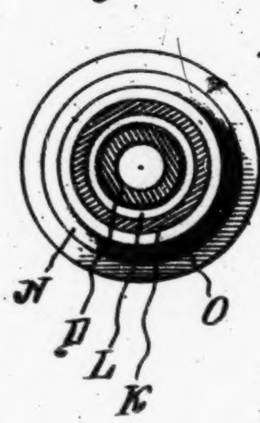
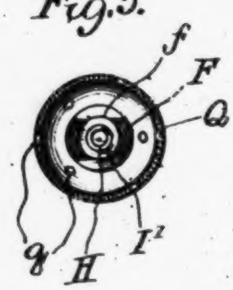


Fig. 5.



Inventor
Edgar C. Johnston
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Attorneys.

Patented Jan. 27, 1931 1,790,424

UNITED STATES PATENT OFFICE

EDGAR C. JOHNSTON, OF EL DORADO, ARKANSAS

TOOL FOR TESTING WELL FORMATIONS

Application filed September 25, 1929. Serial No. 395,150.

My present invention relates to improvements in well testing tools, and it is especially intended to provide a well testing tool which may be used in connection with the drill pipe, the bit being removed, without the necessity of a double line of piping. The invention is intended to provide a compact and efficient testing tool which may be conveniently attached to or removed from the lower end of the drill pipe, and which may be conveniently used to test the various formations which may be encountered as the operation of boring the well progresses.

My invention is especially intended to provide certain improvements on the construction shown in my Patent No. 1,709,940, granted April 23, 1929, and entitled Well formation testing device.

My invention will be more fully understood after reference to the accompanying drawings, in which like parts are indicated by similar reference symbols throughout the several views, and in which,

Figure 1 shows a section through a well before the well casing has been inserted, and with the rat hole bored at the lower end thereof, with the testing tool shown therein in elevation and partly in section, and with the main valve in the open position,

Figure 2 is a similar view to Figure 1, but shows the apparatus in central vertical section with the main valve in closed position,

Figure 3 shows a section through the apparatus along the line 3—3 of Figure 2 and looking down,

Figure 4 shows a section along the line 4—4 of Figure 2, and looking down, and

Figure 5 shows a section along the line 5—5 of Figure 2, and looking down.

A represents the walls of the well bore A°, and A′ represents the rat hole, and a° represents the bottom of the well bore, which constitutes a circular shelf surrounding the top of the rat hole A′. B represents the drill pipe which is threaded at its lower end *b* to engage the housing C, which is perforated, as at *c*, and is provided with internal screw threads *c′* to engage the tube D, which tube forms the upper portion of the valve stem D′ carrying the main valve E. The tube D and the valve stem D′ are screwed together, as at *d*, and the valve stem is vertically perforated, as at d°, and is provided with lateral perforations *d′* for reasons that will be hereinafter described.

The lower end of the valve stem D′ is shouldered, as at d^2, and is screw threaded above said shoulder, so that the valve E may be screwed on and held in place on the stem. The lower end of the valve stem is screw threaded, as at d^3, to engage the cage F for the emergency valve G. This emergency valve is pressed on a seat d^4 at the end of the valve stem by the coil spring H, whose tension may be adjusted by the adjusting screw I and washer I′. The sides of this cage are open, as at *f*, see Figure 5, so as to permit the flow of liquid through the cage, as will be hereinafter more fully described.

Slidably mounted on the tube D and the valve stem D′ is an outer casing comprising the collar J, which is connected to the union K, which in turn is connected to the tube L.

To the lower end of this tube L, a tubular piece M is screwed, provided with the valve seat *m*. The parts L and M may be made integral, if desired, but for convenience in manufacture, it is preferable to have them separately connected together. The union K is externally threaded near its lower end to engage the collar N, which bears upon the upper end of the packer O. This packer is preferably made of a series of rings of rubber or leather or both, and is tapered toward the bottom so as to enter partly into the rat hole, as shown. Below the packer O, the tube L is externally screw threaded to engage the ring P to which the tubular valve casing Q is attached. This valve casing is in the form of a hollow shell with an ogival head, and encloses both the main valve E and the emergency valve G. This valve casing is perforated, as at *q*, to permit the passage of liquid, or partly liquid material, through the same and into the interior of the valve casing.

Above the collar J the coil spring R is mounted under compression, so as to hold the valve normally closed. Suitable packing S, see Figure 2, is provided between the tube D and the union K slidably mounted thereon.

The operation of the well testing tool is as follows:

Suppose the well to be bored in the usual way until a promising formation is reached, then draw up the drill pipe and remove the large bit, and put on a smaller bit and bore the rat hole to the desired depth.

The shoulder a^6 of the rat hole will preferably be in a rock formation, so as to form a suitable seat for the packer, as will be hereinafter described.

After the rat hole has been bored, pull up the drill pipe and replace the bit with the testing tool, which may be done by simply screwing the housing C on to the lower end of the drill pipe, and then lower the drill pipe carrying the tool into the well. Ordinarily, no obstruction is had until the packer O brings up against the shelf a^6 at the upper end of the rat hole. This will arrest the casing surrounding the valve stem, and the valve stem will continue for a brief instant, compressing the spring R and opening the valve, which will then assume the position shown in Figure 1. The main valve will be closed while the tube is being lowered into the well, as indicated in Figure 2. After the main valve is opened, some of the liquid in the formation reached by the valve casing will flow in through the perforations q, and passing around the valve will enter the valve stem D′, through the perforations d', and will flow up through the passage d^5 into the drill pipe.

It will be noted that the liquid flowing into these perforations d' will be well clear of both the valve and its seat, and will not tend to clog up the annular space between the valve and its seat when the main valve is open.

After the valve casing has been submerged in the liquid in the rat hole long enough to secure specimens, by lifting up on the drill pipe, until the packer is removed from its seat, the main spring D will automatically close the main valve and will also close the perforations d', and any liquid contained in the valve stem at the lower end of the drill pipe may be drawn up to the surface, and examined in the usual way.

Thus, it will be seen that the main valve automatically opens when the packer reaches the top of the rat hole, and is automatically closed when the packer is released from its engagement with its seat.

The foregoing operation assumes that the tool may be lowered through the open well, which ordinarily would not be provided with the well casing, until it reaches the rat hole, but should the tool encounter any obstacle as from the tumbling in of the side walls of the well before it reaches the rat hole, the drill tube and tool must be removed from the well and the obstruction removed. The removal of the tool will be materially facilitated by the insertion of liquid under pressure below the obstruction, and this may be accomplished from the surface of the ground by pumping liquid under pressure into the drill pipe, which will pass the apertures d', which will then be in a closed position, as shown in Figure 2, and this liquid will force the emergency valve G open against the spring H, and permit this liquid to flow out through the openings f in the cage F, and thence through the openings q of the valve casing Q into the well below the obstruction.

Thus by applying sufficient liquid pressure from beneath, the effort to lift the drill pipe carrying the tool up through the well will be greatly reduced; moreover, the liquid so introduced tends to lubricate the side walls of the well after the tool has been released from the obstruction, and this tool will facilitate the lifting of the drill pipe, especially where the side walls of the well have crumbled in.

It will be seen that any pressure from beneath in the well will tend to normally close the emergency valve and will also tend to force the main vave on its seat, whereas in the patented construction referred to, the pressure from beneath will tend to open the main valve.

It will be seen that the main valve and the emergency valve are close together, and are protected by the valve casing, which serves to screen off solid particles and permit the liquid or semi-liquid to enter from the well. Moreover, the parts may be readily assembled or disassembled for convenience of inspection or repair.

From the foregoing, it will be seen that the tool comprises (1) a hollow valve stem with means for attaching same to the drill pipe, said valve stem carrying the main valve and the emergency valve, (2) a casing slidably mounted on the valve stem carrying the packer, the valve seat, and the hollow casing for the two valves, and (3) a main spring mounted on the upper end of the hollow valve stem, tending to automatically hold the main valve on its seat.

While I have shown one embodiment of the invention in its preferred form, it will be obvious that various changes might be made in the construction, combination and arrangement of the parts, which could be used without departing from the spirit of my invention, and I do not mean to limit the invention to such details except as particularly pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a main frame slidably mounted on said valve stem, a sleeve provided with a

valve seat secured to said frame, said sleeve adapted to close said perforations, when the main valve is on its seat, a perforated hollow valve casing, attached to the lower end of said main frame and enclosing said main valve, a packer carried by said main frame, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

2. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a main frame slidably mounted on said valve stem, a sleeve provided with a valve seat secured to said frame, said sleeve adapted to close said perforations when the main valve is on its seat, a perforated hollow valve casing having an ogival point attached to the lower end of said main frame and enclosing said main valve, a packer carried by said main frame above said valve casing, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

3. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a cage carried by the lower end of said stem, a spring-impressed auxiliary valve mounted in said cage, and normally closing the lower end of said valve stem, a main frame slidably mounted on said valve stem, a sleeve provided with a valve seat secured to said frame, said sleeve adapted to close said perforations when the main valve is on its seat, a perforated hollow valve casing, attached to the lower end of said main frame and enclosing said main valve, and said cage, a packer carried by said main frame, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

4. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a cage carried by the lower end of said stem, a spring-impressed auxiliary valve mounted in said cage, and normally closing the lower end of said valve stem, a main frame slidably mounted on said valve stem, a sleeve provided with a valve seat secured to said frame, said sleeve adapted to close said perforations when the main valve is on its seat, a perforated hollow valve casing having a tapered point attached to the lower end of said main frame and enclosing said main valve and said cage, a packer carried by said main frame above said valve casing, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

5. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a main frame slidably mounted on said valve stem, a valve seat secured to said frame, a perforated hollow valve casing attached to the lower end of said main frame and enclosing said main valve, a packer carried by said main frame, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

6. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a main frame slidably mounted on said valve stem, a valve seat secured to said frame, a perforated hollow valve casing having an ogival point attached to the lower end of said main frame and enclosing said main valve, a packer carried by said main frame above said valve casing, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

7. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a cage carried by the lower end of said stem, a spring-impressed auxiliary valve mounted in said cage, and normally closing the lower end of said valve stem, a main frame slidably mounted on said valve stem, a perforated hollow valve casing attached to the lower end of said main frame and enclosing said main valve, and said cage, a packer carried by said main frame, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

8. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a cage carried by the lower end of said stem, a spring-impressed auxiliary valve mounted in said cage, and normally closing the lower end of said valve stem, a main frame slidably mounted on said valve

stem, a valve seat secured to said frame, a perforated hollow valve casing having a tapered point attached to the lower end of said main frame and enclosing said main valve and said cage, a packer carried by said main frame above said valve casing, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

9. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a cage carried by the lower end of said stem, a ball valve mounted in said cage, a coil spring also mounted in said cage, and normally holding said ball against the lower end of said valve stem, a main frame slidably mounted on said valve stem, a valve seat secured to said frame, a perforated hollow valve casing attached to the lower end of said main frame and enclosing said main valve, and said cage, a packer carried by said main frame, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

10. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a cage carried by the lower end of said stem, a ball valve mounted in said cage, a coil spring also mounted in said cage, and normally holding said ball against the lower end of said valve stem, means for adjusting the compression of said coil spring, a main frame slidably mounted on said valve stem, a valve seat secured to said frame, a perforated hollow valve casing attached to the lower end of said main frame and enclosing said main valve, and said cage, a packer carried by said main frame, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

11. A testing tool for use incident to the drilling of oil wells, comprising a hollow valve stem, provided with lateral perforations, with means for securing said valve stem to the drill pipe, a main valve carried by said stem, a cage carried by the lower end of said stem, an auxiliary valve and a valve spring under compression also mounted in said cage, said auxiliary valve normally closing the lower end of said valve stem, means for adjusting the compression of said spring, a main frame slidably mounted on said valve stem, a sleeve provided with a valve seat secured to said frame, said sleeve adapted to close said perforations when the main valve is on its seat, a perforated hollow valve casing attached to the lower end of said main frame and enclosing said main valve and said cage, a packer carried by said main frame above said valve casing, and a coil spring surrounding said valve stem and tending to press said frame and said valve stem in reverse directions, whereby said main valve is normally kept closed.

EDGAR CLINTON JOHNSTON.

June 4, 1929 J. L. JOHNSTON ET AL 1,715,504

RELEASABLE VALVE

Filed Aug. 10, 1928 2 Sheets-Sheet

Fig 3

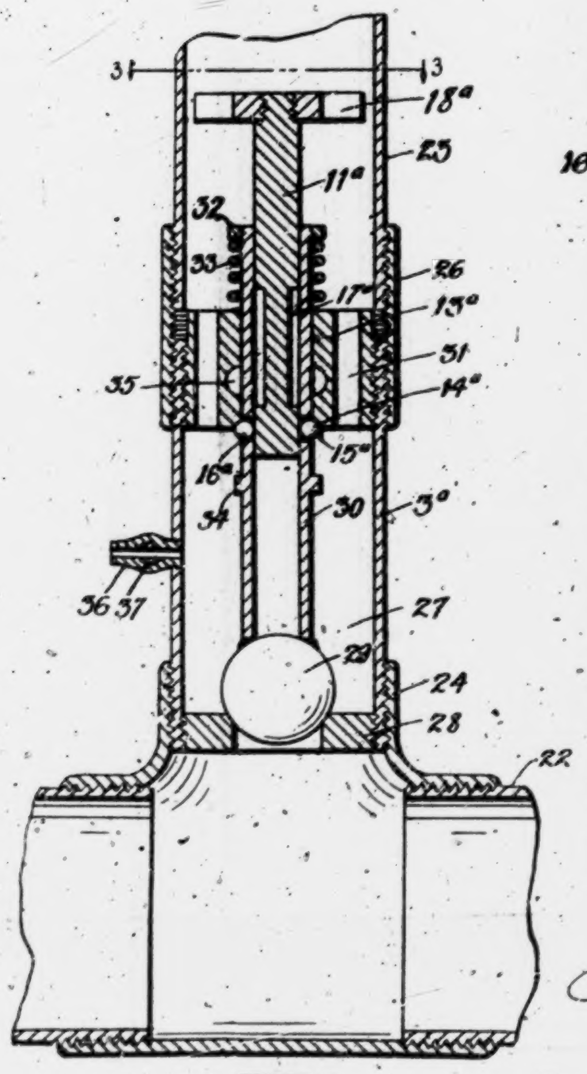

Fig 2

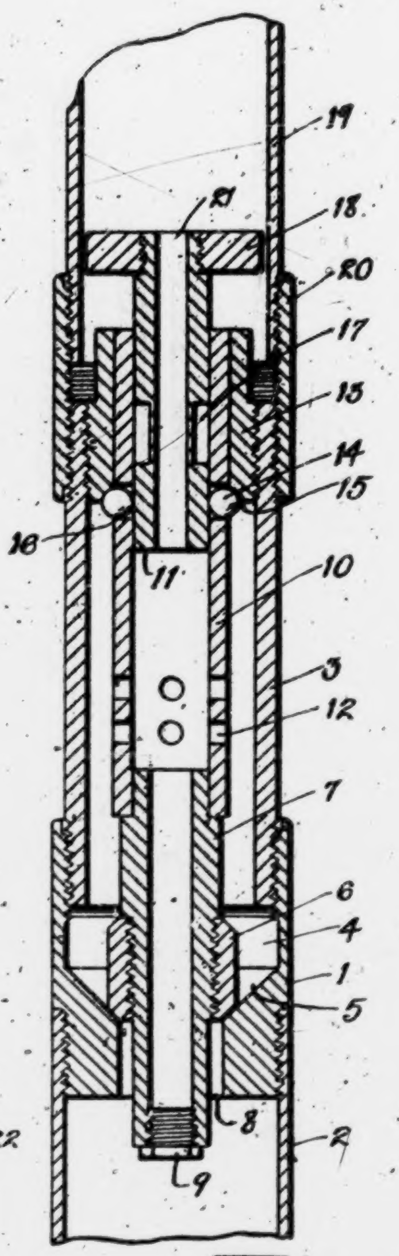

Fig 1

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Edgar C. Johnston
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By Jesse R. Stone
Their Attorney

June 4, 1929. J. L. JOHNSTON ET AL 1,715,504

RELEASABLE VALVE

Filed Aug. 10, 1928 2 Sheets-Sheet 2

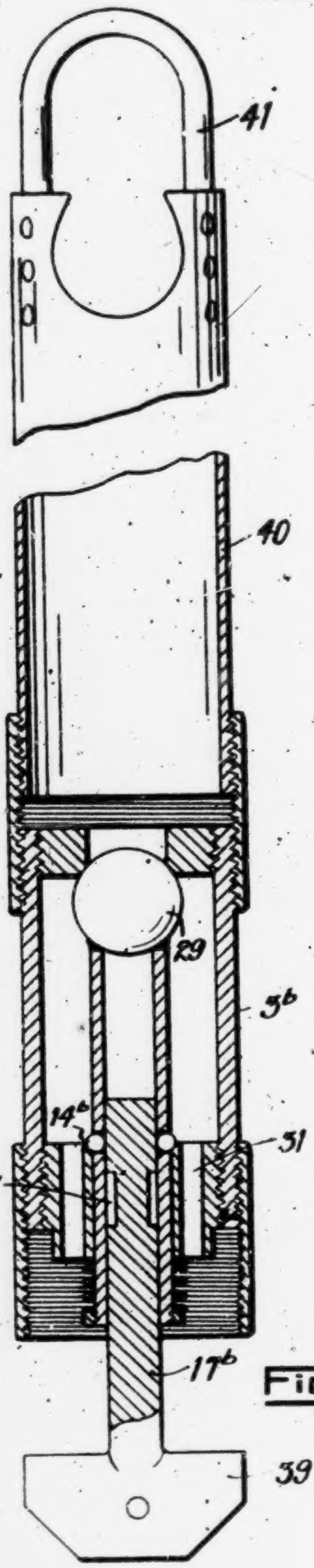

Fig 5

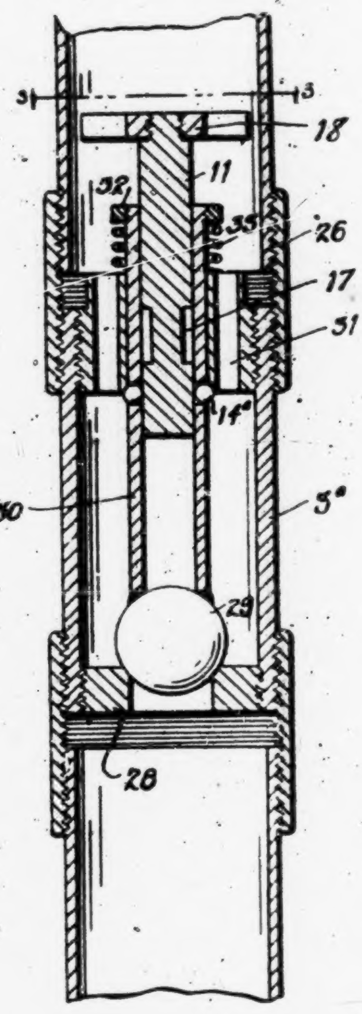

Fig 4

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Patented June 4, 1929. 1,715,504

UNITED STATES PATENT OFFICE.

JAMES L. JOHNSTON, EDGAR C. JOHNSTON, AND BLAINE JOHNSTON, OF ELDORADO, ARKANSAS.

RELEASABLE VALVE.

Application filed August 10, 1928. Serial No. 298,818.

Our invention relates to valves generally, but more particularly to valves which may be employed for oil field work, said valves being of the type which are normally closed, but which may be released and opened while in inaccessible positions without removing the same from its position, or exposing the valve for manipulation.

It frequently happens, in oil field operations, that it is desirable to employ a valve in pipes such as drill stems, eduction pipes for conducting oil from a well, pipe line laterals, dump buckets for cement, and the like; where the valve is closed when introduced into the well, or otherwise positioned for use, but which must be capable of opening thereafter at the proper time.

It is an object of our invention to provide a valve of simple construction, which may be released from locked position after it has been introduced into the well, or after it has been placed in an inaccessible position in a pipe line.

It is desired that means be provided upon the valve to latch it firmly in closed position, but which may be positively released by means introduced into the pipe and operated through gravity or by fluid pressure, or other similar means, when the opening of the valve is desired.

It is also an object to employ means which, when the valve has been released, will automatically latch the valve in open position.

It is to be understood that the valve is capable of wide application but, in the drawings we have shown several embodiments thereof, illustrative of certain of the devices in which it may be employed.

Fig. 1 is a central vertical section of a valve in a fluid line adapted for well work.

Fig. 2 shows a broken section of pipe line, with our valve shown in a lateral line connected therewith, the device being in central horizontal section.

Fig. 3 is a transverse section on the plane 3—3 of Fig. 2. Fig. 4 is a central longitudinal section through a valve embodying our invention, this form being similar to the Fig. 2 embodiment. Fig. 5 is a longitudinal section through a dump bucket employing the invention shown in Fig. 4.

In Fig. 1 an embodiment of the invention is shown which may be employed in a casing or other pipe when said pipe is introduced into the well; as for example, when a casing is floated into the well to take the weight off the line. It is, however, adapted for various similar uses. In this structure there is a lower valve casing 1 threaded at its lower end to connect with a pipe or shoe 2, projecting in advance of the valve. The upper end of the casing is threaded internally to connect with a barrel or housing 3. On the inner part of the casing 1 is a chamber 4, below which the walls of the casing are thickened and provided with a downwardly tapered seat 5, to receive the valve 6. Below the valve seat the passage 7 leads through to the pipe 2.

The valve 6 is formed by a collar or ring screwed upon a tubular stem 7. The valve is tapered at both ends to fit the seat, and may be unscrewed from the stem and reversed to accommodate for wear. The lower end of the stem 8 is threaded to receive a plug 9, closing the same.

The upper end of the stem 7 is secured to a cylinder 10, which forms an extension thereon; the interior of the cylinder being formed to receive a releasing plunger 11.

The said cylinder is provided with a series of openings 12 above the stem 7, and its upper end is extended to fit within a stop collar 13. The said collar is screwed within the upper end of the barrel 3, and the lower end thereof is formed with an inclined shoulder 14 which acts as a stop for the latching balls 15.

The balls 15 are set in openings 16 in the cylinder 10 at a level spaced from the upper end of the cylinder. They are held in position, projecting through these openings against the shoulder 14 by the plunger 11. Said plunger fits closely within the cylinder, and has a frictional fit therein. It is adapted to slide in the cylinder, however, when force is applied to the upper end thereof. Intermediate the ends of the plunger is an annular groove 17, said groove being adapted to receive the balls 15 and, as will be noted, the groove is materially wider than the balls. The upper end of the plunger has a top plate or disc 18 which may be screwed on the reduced upper end of the plunger.

The barrel 3 is connected to the main line of the casing 19 by means of a coupling 20.

When this device is employed as a valve for floating casing into the well, it is assembled as shown in Fig. 1. The balls 15 are placed in proper position and the hold-down

collar 13 is adjusted into position to hold the valve 6 firmly in its seat. In this position it is introduced into the well and will serve to prevent fluid from entering the lower end of the pipe. When it is desired to release this valve to allow fluid to enter the casing a heavy object such as a pipe coupling or a heavy ball valve may be dropped from the surface downwardly through the casing 19, striking a blow upon the plunger plate 18. This will drive the plunger downwardly in the cylinder 10 bringing the groove 17 in the plunger opposite the balls 14, allowing the balls to move from their position against the shoulder 14 and thereby releasing the cylinder 10 and the valve so that the fluid pressure from below the valve may raise it from its seat. The fluid from below will then pass into the valve chamber 4 and upwardly through the openings 12 to the interior of the cylinder 10. It may then flow upwardly through a central passage 21 in the plunger to the interior of the casing.

It will be obvious that this valve may be used in this manner for other purposes than in floating casing into the well. This use of the device is given as illustrative only of one way in which it may be employed.

It may be changed slightly for use in pipe line work, and, in Figs. 2 and 3, we have shown how it may be thus used. In pipe lines, lateral connections leading to the main line are sometimes not used for a material length of time and must be closed by a valve adjacent the connection between the lateral line and the main line. It is desirable to employ a valve which is not open for manipulation from the outside, but which may be opened when the lateral is brought into use. Our valve may be employed for this purpose. In Fig. 2, the main line is indicated at 22. The lateral line 23 is connected thereto by means of a T-shaped coupling 24. A short section of pipe 3^a is employed as a casing connecting the lateral line 23 with the coupling, said line and casing being connected through the collar 26.

Within the casing 3^a is a valve chamber 27, a valve seat is formed at the inner end of the casing by means of a plate 28, having an opening therein to receive a ball valve 29.

The ball valve 29 is secured, by welding or otherwise, to the inner end of a tubular valve stem 30. Said stem is slidable within the stop collar 13^a, similar in construction to the stop collar of the previous embodiment except that it has longitudinal openings 31 therethrough, connecting the valve chamber with the line 23.

The stem 30 forms a cylinder to receive the plunger 11^a which is slidable therein and has a circumferential groove 17^a into which the latching balls 15^a may be received. Said balls are fitted within openings 16^a and bear against a shoulder 14^a which holds the valve stem and valve in closed position. The upper end of the stem 30 has a nut 32 thereon and a spring 33 bearing against said nut and the upper end of the stop collar 13^a tends to force the valve stem and valve away from the valve seat. The stem is formed with a radial flange 34, spaced from the inner side of the stop collar, to limit the movement of the stem outwardly. On the inner side of the stop collar 13^a we may provide an annular groove 35 to receive the latching balls 15^a. The outer end of the plunger has thereon a plate 18^a as in the previous embodiment. From Fig. 3 it will be noted that this plate has radial arms which allow the free passage of fluid between them.

A lateral vent 36 may be formed in the casing 25, said vent having a cock 37, whereby the flow of fluid therethrough may be controlled.

In the operations of this device, the valve will be normally closed. When it is desired to pump fluid through the pipe 23 to the main line, a loose fitting plunger or similar device may be placed in the line 23 ahead of the oil. The tap 37 will be opened to allow a vent for air ahead of the plunger. The plunger will be forced by the oil being pumped into the line, against the plate 18^a, moving the plunger 11^a inwardly until the groove 17^a receives the latching balls. The spring 33 will then throw the valve 29 into open position and the fluid will pass through the openings 31 to the pipe line. The tap 37 may then be closed.

The arrangement of the groove 35 in the stop sleeve 13^a will enable us to latch the valve in open position, the balls 15^a will enter the groove 35 by gravity and will prevent the sliding of the stem thereafter.

In Fig. 4, the Fig. 2 embodiment is shown as adapted for use in the same manner as is that shown in Fig. 1, for floating a pipe into the hole, or for similar operations. The means for latching the valve in open position is, however, omitted, it being understood that this feature of the valve may be employed wherever desirable.

In Fig. 5, the valve is adapted for use on a dump bucket such as is employed in handling cement in completing the setting of casing. Here the valve is inverted in position. The ball 29 is below the seat and the plunger 11^b is formed with a dart 39 on the outer end as is usual with dump valves. The valve 3^b is connected at its upper end to the bucket 40 having a bail 41.

When the device is operated, the bucket is assembled as seen in Fig. 5 with the valve closed. The bucket is filled with cement and lowered in the usual way to the bottom of the well. When the bottom is reached, the dart 39 will strike the bottom and the plunger will be moved to bring the groove 17 into registration with the latching balls allowing them to move free of the shoulder 14^b

so that the spring 33 will open the valve 29 allowing the cement to be dumped and the bucket withdrawn.

It will be readily understood from the examples above noted that the valve structure illustrated is adapted for various uses where the valve is inaccessible for manual control when the opening becomes desirable.

What we claim as new is:

1. A valve including a casing, a valve seat therein, a valve in said seat, a valve stem on said valve, a stop sleeve through which said stem is slidable, balls in said stem adapted to contact with said sleeve, means to release said balls and means to open said valve when said balls are released.

2. A valve including a casing, a valve seat therein, a valve member in said seat, a valve stem on said member, a stop collar through which said stem is slidable, a shoulder on the side of said stop collar adjacent said valve member, balls in said stem adapted to engage said shoulder when said valve is closed, means to hold said balls in latching position, but adapted to be moved to release said balls and said valve member.

3. A valve including a casing, a valve seat therein, a valve member in said seat, a valve stem on said member, a stop collar through which said stem is slidable, a shoulder on the side of said stop collar adjacent said valve member, means on said stem engaging said shoulder to hold said valve member in closed position, and means slidable relative to said stem to release said holding means, to allow said valve to be opened.

4. A valve including a casing, a valve seat therein, a valve member in said seat, a valve stem on said member, a stop collar through which said stem is slidable, a shoulder on the side of said stop collar adjacent said valve member, means on said stem engaging said shoulder to hold said valve member in closed position, a cylinder in said stem, a plunger in said cylinder engaging said holding means, said plunger being adapted to move responsive to a blow thereon and release said holding means.

5. A valve including a seat, a valve member in said seat, a stem on said valve member, a stop collar having a shoulder adjacent said stem, means on said stem engaging said shoulder to hold said valve member in said seat, and means slidable in said stem to release said holding means.

6. In a valve, a casing, a valve seat therein, a valve member in said seat, a valve stem on said valve, a cylinder on said stem, a plunger in said cylinder, a shoulder in said casing, means on said cylinder engaging said shoulder to hold said valve member in said seat, said means being releasable by the inward movement of said plunger.

7. In a valve, a casing, a valve seat therein, a valve member in said seat, a valve stem on said valve, a cylinder on said stem, a plunger in said cylinder, a shoulder in said casing, balls in the walls of said cylinder engaging said shoulder to hold said valve closed, means holding said balls in position engaging said shoulder, said means being slidable relative to said stem to release said balls.

8. In a valve, a casing, a valve seat therein, a valve member in said seat, a valve stem on said valve, a cylinder on said stem, a plunger in said cylinder, a shoulder in said casing, means on said cylinder engaging said shoulder to hold said valve member in said seat, said means being releasable by the inward movement of said plunger and positive means to throw said valve member into open position when said stem is released.

9. In a valve, a valve casing, a valve seat therein, a stop collar, a valve member in said seat, a valve stem slidable in said collar, means on said stem engaging said collar to hold said valve member in said seat and means responsive to pressure thereon to release said holding means.

10. In a valve, a valve casing, a valve seat therein, a stop collar, a valve member in said seat, a valve stem slidable in said collar, means on said stem engaging said collar to hold said valve member in said seat, means responsive to pressure thereon to release said holding means and means to force said valve from its seat.

11. In a valve, a valve casing, a valve seat therein, a stop collar, a valve member in said seat, a valve stem slidable in said collar, means on said stem engaging said collar to hold said valve member in said seat, means responsive to pressure thereon to release said holding means, means tending to move said valve member from its seat, and means whereby said holding means may latch said valve member in open position.

12. A valve including a casing, a seat at one end thereof, a valve member in said seat, a stem on said valve, and adjustable stop collar in which said stem is slidable, a cylinder in said stem, balls fitting in openings in the wall of said cylinder, a plunger in said cylinder adapted to force said balls into position to engage said collar and hold said valve in said seat, said plunger having recesses to receive said balls, when said plunger is moved into said cylinder and thus release said valve member.

13. A valve including a casing, a seat at one end thereof, a valve member in said seat, a stem on said valve, an adjustable stop collar in which said stem is slidable, a cylinder in said stem, balls fitting in openings in the walls of said cylinder, a plunger in said cylinder adapted to force said balls into position to engage said collar and hold said valve in said seat, said plunger having recesses to receive said balls, when said plunger is moved into said cylinder and thus release said valve

member, and a spring tending to move said valve stem and valve member when said stem is released.

14. A valve releasing mechanism including in combination a plunger, a concentric sleeve surrounding said plunger, a plurality of apertures in said sleeve and movable means in said apertures, a stop collar about said sleeve, said means adapted to contact with said plunger and said collar to hold the sleeve in rigid engagement therewith.

15. A valve releasing mechanism including in combination a plunger, a concentric sleeve surrounding said plunger, a stop collar about said sleeve, and means carried by said sleeve and operable by said plunger whereby the collar is engaged or disengaged.

16. A valve stem comprising in combination a plunger, an annular cavity on said plunger, a stem, movable means carried by said stem and adapted to partially enter said cavity and a stop collar surrounding said stem to force the movable means into said cavity upon movement of said plunger.

17. A valve releasing mechanism including in combination a plunger, a concentric sleeve surrounding said plunger, a stop collar about said sleeve and means movable through said sleeve to engage or disengage said collar.

In testimony whereof we hereunto affix our signatures this 1st day of August, A. D., 1928.

JAMES L. JOHNSTON.
EDGAR C. JOHNSTON.
BLAINE JOHNSTON.

In the Supreme Court
OF THE
United States

OCTOBER TERM, 1938

No. 466

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),

Petitioners,

vs.

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),

Respondents.

PETITION FOR A WRIT OF CERTIORARI
to the United States Circuit Court of Appeals
for the Ninth Circuit
AND
BRIEF IN SUPPORT THEREOF.

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Table of Contents

Table of Authorities Cited

In the Supreme Court
OF THE
United States

October Term, 1938

No.

Honolulu Oil Corporation, Ltd. (a corporation), and M. O. Johnston Oil Field Service Corporation (a corporation),
Petitioners,

vs.

Erle P. Halliburton and Halliburton Oil Well Cementing Company (a corporation),
Respondents.

PETITION FOR A WRIT OF CERTIORARI to the United States Circuit Court of Appeals for the Ninth Circuit.

To the Honorable Charles Evans Hughes, Chief Justice, and to the Associate Justices of the Supreme Court of the United States:

Petitioners, Honolulu Oil Corporation, Ltd. and M. O. Johnston Oil Field Service Corporation, respect-

fully pray that a writ of certiorari issue to review a decree of the United States Circuit Court of Appeals for the Ninth Circuit entered July 11, 1938. A petition for rehearing was denied on September 12, 1938. The Transcript of Record, in two volumes, is supplied herewith. (Opinion, T. R. Vol. 1, p. 744; Decree, p. 759; Order Denying Petition for Rehearing, p. 760.)

STATEMENT.

This petition presents a direct conflict between the decisions of two Circuit Courts of Appeals in patent infringement suits, involving the same patent. The decisions are *Johnston Formation Testing Corporation v. Halliburton*, 88 F. (2d) 270 (Appendix), and the present suit of *Halliburton v. Honolulu Oil Corporation and M. O. Johnston Oil Field Service Corporation*, 98 F. (2d) 436. (T. R. Vol. 1, p. 744.)

The patent in each case is No. 1,930,987 (T. R. Vol. 2, p. 4) applied for by John T. Simmons and issued on October 17, 1933, after assignment, to respondent Erle P. Halliburton, for a method and apparatus for testing the productivity of formations encountered in drilling oil wells. In each case the same claims were alleged to be infringed. The earlier opinion finds the only two method claims of the patent to be invalid: the later opinion holds them valid and infringed.

The first suit was filed by Erle P. Halliburton, owner of said Simmons patent, and Halliburton Oil Well Cementing Company, exclusive licensee, also respondents herein, in the District Court of the United States

for the Eastern District of Texas. Johnston Formation Testing Corporation was defendant. District Judge Randolph Bryant, sitting at Tyler, Texas, held both the method and apparatus claims, in suit, *valid* and infringed.

The second and present suit was filed by Erle P. Halliburton and Halliburton Oil Well Cementing Company, respondents herein, in the District Court of the United States for the Southern District of California. Honolulu Oil Corporation, Ltd. and M. O. Johnston Oil Field Service Corporation (a different Johnston Company), petitioners herein, were defendants. District Judge George Cosgrave, sitting at Fresno, California, expressly declined to follow the earlier Texas decision of Judge Bryant and held both the Simmons method and apparatus claims in suit, *invalid* and not infringed.

Thereafter, the Texas decision was appealed, and the United States Circuit Court of Appeals for the Fifth Circuit, in *Johnston Formation Testing Corporation v. Halliburton,* 88 F. (2d) 270 (Appendix), in a unanimous opinion written by Circuit Judge Sibley, reversed Judge Bryant of Texas and expressly following Judge Cosgrave of California, held the Simmons method claims *invalid* and the apparatus claims not infringed. Certiorari to this Court was denied. (301 U. S. 691, 57 S. Ct. 793.)

Thereafter, the California decision was also appealed and the United States Circuit Court of Appeals for the Ninth Circuit in the present case, 98 F. (2d) 436, opinion written by Circuit Judge Wilbur (T. R.

p. 744), although fully aware of the earlier Fifth Circuit decision, mentioned in the opinion, reversed Judge Cosgrave of California and finding directly contrary to the Circuit Court of Appeals of the Fifth Circuit, held the method claims *valid* and infringed, but the apparatus claims invalid.

The defendants' device and method were identical in both cases. The records, including exhibits, were substantially the same in both cases. Certain fact testimony regarding derivation of the invention by Simmons from one Philip was omitted in the California suit but important additional prior art publications tending further to invalidate the Simmons patent, appeared in the California but not in the Texas record.

The testing of oil wells is of immense importance to the oil well industry, as is apparent from the extensive litigation over the Simmons patent and the record in this case. (T. R. Vol. 1, pp. 90-96.)*

Under the earlier opinion of the Circuit Court of Appeals of the Fifth Circuit, the Johnston oil well testing tool and the method in which it is used for testing oil wells, is free and clear of both the method and apparatus claims of the Simmons patent, and such tool may be made, used or sold by the oil well industry, in Texas, Louisiana and other States composing the Fifth Federal Judicial Circuit, without paying tribute to respondents herein.

*Respondent Erle P. Halliburton testified that up to September, 1935, approximately 7500 commercial well tests were made by his company. He also contended that the alleged invention had been adopted as standard practice by oil well companies throughout the United States.

Under the later decision of the Circuit Court of ppeals of the Ninth Circuit, however, the same John-on oil well testing tool is free and clear of only the pparatus claims of the Simmons patent, because the ourt has held them invalid, and while such tool may e made and sold in California and other western ates, still it cannot be used in that territory for sting oil wells, for the reason that the Court has held ich use infringes the two alleged valid method claims f the Simmons patent.

A direct conflict therefore exists between the Fifth nd Ninth Circuits. Method claims 8 and 18 of the immons patent are invalid in the Fifth Circuit but alid and infringed in the Ninth Circuit.

REASONS RELIED ON FOR ALLOWANCE OF WRIT.

The discretionary power of this Court to grant a rit of certiorari is invoked upon the ground set forth Rule 38, subdivision 5(a), of this Court, in that the ircuit Court of Appeals for the Ninth Circuit "has ndered a decision in conflict with the decision of nother circuit court of appeals on the same matter", -wit, the Circuit Court of Appeals for the Fifth ircuit. That conflict affects very substantial indus-ial interests. It cannot be resolved otherwise than a decision of this Court.

The two method claims of the Simmons patent are valid and unpatentable for the following reasons:

1. The method merely describes the function of a particular apparatus designed and intended

to be used solely for a particular purpose in a particular setting.

2. The alleged process of the method claims describes at best, only a different use for an old device, which different use is in itself old.

3. The method claims depend for their novelty solely upon the mechanical limitations which appear in the claims, placed there expressly in order to avoid the prior art.

4. The method claims lack patentable novelty over the prior art.

The Circuit Court of Appeals for the Ninth Circuit therefore erred in holding the two method claims valid and infringed.

Wherefore your petitioners respectfully pray that this petition be granted and that a writ of certiorari be issued and directed to the Circuit Court of Appeals for the Ninth Circuit.

Dated, San Francisco, California,
November 2, 1938.

Honolulu Oil Corporation, Ltd.,
M. O. Johnston Oil Field Service Corporation,
By A. W. Boyken,
A. J. Hill,
Attorneys for Petitioners.

In the Supreme Court
OF THE
United States

OCTOBER TERM, 1938

No.

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),

Petitioners,

vs.

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),

Respondents.

BRIEF IN SUPPORT OF PETITION FOR A WRIT OF CERTIORARI.

I.

OPINIONS IN THE COURTS BELOW.

The opinion of the Circuit Court of Appeals for the Ninth Circuit, in the instant case is reported as *Halliburton v. Honolulu Oil Corporation et al.*, in 98 F. (2d) 436 (T. R. Vol. 1, p. 744), and the opinion of the

District Court in the same case is reported in 18 F. Supp. 58.

The opinion of the Circuit Court of Appeals for the Fifth Circuit, the earlier conflicting decision, is reported as *Johnston Formation Testing Corporation et al. v. Halliburton*, in 88 F. (2d) 270 (Appendix herein), there being no reported opinion by the District Court.

II.

JURISDICTION OF THIS COURT.

The jurisdiction of this Court is invoked under Section 240(a) of the Judicial Code. (28 U. S. C. A. 347.)

The date of the decree sought to be reviewed is July 11, 1938, but the petition for rehearing was not denied until ~~on~~ September 13, 1938.

III.

STATEMENT OF THE CASE.

This is a suit in equity for infringement of Simmons Patent No. 1,930,987, dated October 17, 1933, and entitled "Method and Apparatus for Testing the Productivity of Formations Encountered in Wells". (T. R. Vol. 2, p. 4.)

The patent contains altogether nineteen separate claims, of which seventeen are apparatus and two are method claims. Only twelve claims were in suit, these being apparatus claims 9, 10, 11, 12, 13, 14, 15, 16, 17

and 19, and method claims 8 and 18. The District Court in the instant case, held the entire twelve claims to be invalid and not infringed. On appeal, the Circuit Court of Appeals for the Ninth Circuit, affirmed the District Court as to the invalidity of the ten apparatus claims but nevertheless held the two method claims, viz., 8 and 18, to be valid and infringed.

This latter finding, in respect to the two method claims, we assert is erroneous and in direct conflict with an earlier decision of the Circuit Court of Appeals for the Fifth Circuit, which found the same two method claims to be invalid.

Although the reasoning of the Circuit Courts of Appeals for the Fifth and Ninth Circuits differ somewhat in respect to the ten apparatus claims, nevertheless the defendants in each case prevailed, so that no conflict arises between the two Courts in the result reached as to the alleged infringement of the apparatus claims.

This petition is therefore limited to the question of whether method claims 8 and 18 of Simmons Patent No. 1,930,987 are valid or invalid. *Crown Cork & Seal Co. v. Ferdinand Gutmann Co.*, 304 U. S. 159, 58 S. Ct. 842, and *General Talking Pictures Corporation v. Western Electric Co.*, 304 U. S. 175, 58 S. Ct. 849. Should the Court determine that the two claims are valid, then the further question might arise as to whether the petitioners have infringed those claims.

IV.

ARGUMENT.

The testing of oil wells requires the isolation of the formation to be tested from the remainder of the well. In rotary drilling, this is accomplished by means of a packer, attached to the drill pipe and lowered into the well hole. The packer relieves the isolated area from the hydrostatic pressure of the rotary mud and other fluids above, and permits the formation fluid from the isolated area to flow into the drill pipe, where it is entrapped and withdrawn from the well for the purpose of testing.

The apparatus for making such tests includes (1) a pipe having an inlet at the lower end, (2) a packer carried by said pipe, and (3) a valve for opening or closing the inlet when the packer is set.

The Simmons patent attempts to claim the foregoing method and apparatus for testing wells.

The Circuit Court of Appeals for the Ninth Circuit, in the present case held that the ten apparatus claims, in suit, of the Simmons patent, were *invalid* because anticipated in an earlier patent to Franklin, No. 263,330, dated August 29, 1882 (T. R. Vol. 2, p. 347), which disclosed the same combination of (1) pipe, (2) packer and (3) valve.

The Court, however, held that the two method claims, which merely describe the manner in which the Simmons apparatus was intended to be used, were *valid* and infringed.

The anomalous situation is presented that although the Simmons testing device is anticipated and old in

the oil well testing art, and therefore available to the public without the payment of tribute, still when such testing device is actually used in the precise manner and for the very purpose in which it was intended to be used, such use will be enjoined in the Ninth Circuit. In effect, the so-called method claims dominate the situation and actually give the patent owner a monopoly in the use of an old device.

We respectfully assert that cannot be sound patent law. The Circuit Court of Appeals for the Ninth Circuit must have been in error when it held the two method claims to be valid. That Court should have reached the same conclusion as the Circuit Court of Appeals for the Fifth Circuit, which held that the two method claims were invalid because they embodied no invention over the earlier patent to Franklin, No. 263,330, especially after the disclosures in patents to Cox, No. 1,347,534, and Edwards, No. 1,514,585. (T. R. Vol. 2, pp. 347, 365 and 386.) The same Franklin, Cox and Edwards patents, and much additional prior art, were included in the Ninth Circuit case.

This case, therefore, is one calling for the exercise of the supervisory powers of this Court, in order that confusion and uncertainty in the industry, caused by conflicting decisions on the validity of the method claims of the Simmons patent, be terminated. Under the authority of the recent decision in *General Electric Co. v. Wabash Appliance Corporation*, 304 U. S. 364, 58 S. Ct. 899, as well as many earlier cases, a writ of certiorari should be granted so that this Court may

review the decision of the Circuit Court of Appeals for the Ninth Circuit and finally reverse it.

Dated, San Francisco, California,
November 2, 1938.

Respectfully submitted,
A. W. Boyken,
A. J. Hill,
Attorneys for Petitioners.

Kenneth K. Wright,
Vincent Morgan,
W. M. Farrer,
Of Counsel.

(Appendix Follows.)

Appendix

88 Fed. (2d) 270.

*Johnston Formation Testing Corporation et al. v. Halliburton et al.**

No. 7991

Circuit Court of Appeals, Fifth Circuit

Jan. 9, 1937

Rehearing Denied Feb. 23, 1937

Appeal from the District Court of the United States for the Eastern District of Texas; Randolph Bryant, Judge.

Suit by Erle P. Halliburton and another against Johnston Formation Testing Corporation and another. From a judgment for plaintiffs, defendants appeal.

Reversed and remanded, with direction:

D. A. Simmons, of Houston, Tex., and J. N. Saye, of Longview, Tex., for appellants.

Leonard S. Lyon and Henry S. Richmond, both of Los Angeles, Cal., and Ben F. Saye, of Duncan, Okl., for appellees.

Before Foster, Sibley, and Hutcheson, Circuit Judges.

Sibley, Circuit Judge.

Erle P. Halliburton and Halliburton Well Cementing Company sued Johnston Formation Testing Corporation and E. C. Johnston for infringement of patent No. 1,930,987, which was applied for by John

*Writ of certiorari denied 57 S. Ct. 793, 81 L. Ed. 1347, 301 U. S. 690.

T. Simmons, alleged inventor, February 10, 1926, but not granted till October 17, 1933. Simmons before applying for the patent assigned an interest to Henderson, but within three months after the application was filed they had assigned first partially and then wholly to Halliburton. The patent covers a method and an apparatus for testing the productivity of formations encountered in drilling oil and other deep wells. The defendants also have patents, granted while the Simmons patent was pending in the Patent Office, under which the alleged infringing apparatus has been used and operations conducted. We read in the proceedings in the Patent Office the statement of Halliburton that twenty patents had been granted in this particular testing art while the Simmons patent was pending, which makes apparent the great activity at this period. It appears in the record that both Halliburton and Johnston and their companies make thousands of these deep well tests and no doubt there are others making them also. Evidently, since Halliburton claims all others to be infringers of the Simmons patent, the monopoly contended for would if established very seriously affect many persons and businesses. In *Edwards v. Johnston Formation Testing Corporation* (D. C.), 44 F. (2d) 607, affirmed (C. C. A.) 56 F. (2d) 49, the present defendants were sued by Edwards, the patentee in No. 1,514,585 issued November 4, 1924, and therefore antedating the Simmons application some fifteen months. The holding was that neither Edwards nor Johnston were pioneers in the well testing art, that Edwards had not a basic patent,

but was only an improver, and his monopoly was limited to his improvement. It is now claimed that the Simmons invention is basic at least in the employment of a single string of pipe to make the test, and in trapping in it an uncontaminated sample from the bottom of the well.

Seven claims only were originally made by Simmons, all for an apparatus and none mentioning the single pipe string as an element. They are not here asserted to be infringed. Claims 8 to 19, inclusive, for method and apparatus, are relied on. They (or their predecessors) were twice rejected by the examiners as anticipated by other patents and twice rewritten in the effort to differentiate or narrow them. They were as now presented again rejected, but on appeal to the Board of Appeals they were allowed, and the patent issued. The decision of the Board of Appeals was followed by the District Judge in this case, but in *Halliburton v. Honolulu Oil Corporation* (D. C.), 18 F. Supp. 58, in the Southern District of California, Judge Cosgrave thought the method claims 8 and 18 were invalid and the apparatus claims if valid were to be restricted to the form disclosed and not infringed, following our conclusion in the case of *Edwards v. Johnston Formation Testing Corporation*, supra. We are of opinion that Judge Cosgrave's conclusion is correct and will state as clearly and as briefly as possible our reasons.

The drilling of very deep wells by the rotary method which has come into extensive use only during the present century, and the methods of testing the strata

pierced practiced before the invention of Edwards, including the use of packers, "rat-holes", and sampling chambers, are described in the opinions in 44 F. (2d) 607, and 56 F. (2d) 49 and need not be repeated. Several of the older patents brought forward in this case were there discussed. What was said of them in relation to the Edwards and Johnston patents is largely true as to the Simmons patent which came into the same art at nearly the same time that Edwards and Johnston did. We will again discuss some of them as specially bearing on the Simmons' claims. Of the method claims 18 is representative, as copied in the margin.* It assumes familiar apparatus and claims a monopoly on a new use of the old apparatus to achieve a result in a better way. That apparatus includes a single string of pipe lowered into the well (the drill stem is always present and usable), a packer on the string (either a rat-hole or an expansible packer), and a valve (of any appropriate kind) at the lower end of the string. These three simple and well-known elements are to be used by lowering the pipe into the well with the valve closed against the drilling fluid until the packer is set, then by opening the valve to admit cognate fluid below the packer, then by closing the valve so as again to prevent the drilling

---

*"18. A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognant fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample."

fluid from entering when the packer is released and the pipe drawn up with its contents. Thus broadly claimed (improved apparatus being put out of mind), no novelty and certainly no invention can be claimed for the method. Packers and pipes with valves in them have long been in use to get what is below the packer free from what is above and without removing what is above. Whether a large quantity is taken from a finished well or a small sample from an unfinished well does not materially alter the method nor the function of the elements used. There has always been water encountered in oil wells; and the drilling fluid is only very muddy water voluntarily put and kept in the well for special reasons instead of running in from natural sources. Expansible and removable packers with pipes through them to reach the oil, gas, or other desired fluid beneath are shown in the Stewart patents, No. 171,589, December 28, 1875, and No. 230,080, July 13, 1880. "Rat-hole" packers set by the weight of the piping pressing them down and removable by simply lifting them are shown in Koch, No. 208,610, October 1, 1878; Bloom, No. 785,933, March 28, 1905, and McCready, No. 1,522,197, January 6, 1925. The Cooper patent, No. 1,000,583, August 15, 1911, shows a collapsible packer used to separate water above from what is to be gotten below. The pipe carries a valve to be opened and shut from the surface, but the device is complicated. We find the simplicity of the Simmons method, along with all its operations, reasonably disclosed in the old patent to Franklin, No. 263,330, August 20, 1882. There is the single pipe, with a packer mentioned but its function esteemed so familiar

as to need no emphasis, capable of being lowered into and withdrawn from a well, with the entrance into or escape from the pipe to be controlled by a valve operated from above while the pipe is lowered into or withdrawn from the well. The importance of Franklin to this method claim is that he describes the use of a packer on a single string of pipe with a valve in the pipe in the very operation of putting them in and taking them out of the well. We do not agree with the Board of Appeals that Franklin does not disclose a packer. It is mentioned. Evidently one must be used for without it oil would never flow through the pipe as desired and there could be no use of the valve to control the flow. The packer is necessary to prevent the escape of gas and build up pressure to make the oil flow. It would serve also to cut off water or dirt from above though Franklin does not mention this. We agree however that Franklin did not intend to get a sample from the well by raising the pipe, but intended to keep from getting a sample that way by making his valve a leaking one that would let the contents escape as the pipe is raised. He expected to get what was below the packer by a natural flow, just as Simmons in his disclosure says it is to be preferred; and that is what Simmons got in his first three actual tests, it being gas. But we think that just as Simmons, when the fluid beneath whether gas or oil will not flow, closes his valve and raises his pipe to see what is in it, so one using the Franklin equipment could proceed if he wished to see what was in his pipe.

It would take no invention with such a change of purpose to substitute a valve that would not leak for

the one that does leak on withdrawal. Nor do we think it would be invention for one having a Franklin device to use it to sample a well through drilling fluid instead of using it to flow the well through water or air above the packer. Especially after the disclosures of Cox, No. 1,347,534, July 27, 1920, and Edwards, No. 1,514,585, November 4, 1925, in this very art of testing strata in deep rotary drilled wells by sample taken through the drill stem, with their somewhat complicated devices, we do not think that recurrence for this new use to what is in substance the simple apparatus of Franklin ought to be the foundation for broad method claims such as are here put forth. We hold them, while perhaps not strictly anticipated, to involve no such invention as entitles to monopoly.

The apparatus claims have a different status. They propose a new machine to better accomplish by its employment the useful result. The inventor Simmons, as already stated, put forth seven such claims as his conception of what he had invented. They are not alleged to be here infringed and we express no opinion about them. So soon as Halliburton acquired an interest in the invention, his attorneys added the much broader claims. Claim 15 copied in the margin is typical.* On June 17, 1927, to distinguish prior patents

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*"15. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said packer adapted to be positively pressed aganist the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe."

the claims were rewritten so as to state for the first time that only a single string of pipe is to be used. Edwards thought there were advantages in having more than one pipe string, in which he may be wrong, but again in view of the oil well art we do not think that the omission of the Edwards second pipe to maintain circulation can be said to involve such invention as to give a monopoly of all single string testers as is here claimed. It may be a simplifying improvement on which a combination patent may rest, but is not a basic and pioneer invention. Positive pressure of the packer against the well walls, also written into the claims, appears to refer to the weight of the pipe on the rat-hole packer, but that is the way a rat-hole packer has always worked. We do not think the claims following the first seven can be sustained in all their breadth, but must be limited to the form of apparatus disclosed. Johnston does not use a stop cock valve, nor actuate it by turning the string of pipe, but his means of trapping and withdrawing the sample are substantially different from those disclosed by Simmons. The Johnston apparatus does not infringe.

We have rested the decision upon the grounds already stated, but we have grave doubt that Simmons is the original and sole inventor of the method and apparatus sought to be patented. He gives a strange account of the conception and development of what is now said to be a revolutionary idea. It arose neither from experience, experiment, nor study. It was not either "a leap or a step" in the progress of the art, but a stumble in the dark. He says he was not think-

ing of testers at all, never saw one and knew nothing of them, but was thinking of a float valve to prevent a drill stem from collapsing. In September, 1925, he made a rough model of his rotary-valve tester out of two wooden spools, and about the last of October approached S. E. Carter, whom he had known twenty years, to furnish money to get a patent, which Carter said he would do so soon as he got in funds about the first of the year. In January Carter said he could not spare the money and Simmons went to Henderson, who advanced him $11 to have Eby Engineering Company in the same town to make three blueprints, without dimensions, the bill for which is dated January 22, 1926. One of these was taken to a local machine shop and from it a blacksmith is said to have made forgings and a single machinist to have fabricated a full size tool all by February 2, on which date $60 was paid in full of an invoice worded "Special 4" x 6⅝" Rubber Packer as instructed $60.00." Another blueprint was sent to Washington with application for the patent on February 10, 1926. Simmons says that Carter did not mention to him that he was helping one Philp, also an old acquaintance of both, in the same town and in the same machine shop to get made a similar full size tool and that the very same Eby Engineering Company had made Philp similar blueprints, one of which Philp had sent to Washington with application for patent on November 23, 1925. Carter, on the other hand, says that he and Philp had been working on the Philp tester since early in the spring or summer and the machine shop worked on it at odd times for many weeks, Carter not having

money to pay for it; that Philp gave up his application for patent on receiving from his attorneys in Washington copies of the Cox and Edwards patents, and that the matter was then put in Simmons' hands, he being in Carter's employ. The secretary-treasurer and part owner of the machine shop, who severed his connection with it on November 30, 1925, testified fully by interrogatories to having had the tool made for Carter and Philp at odd times during the early part of 1925 before he left under a special arrangement for credit with Carter, and that they made the metal part but put no rubber packer on it. The judge ruled out his testimony that the metal part could not be made with all modern machinery for $60 and that the packer to go on the tool to hold the water back would cost $60 in his opinion. It does not appear why this testimony was excluded, but we think it ought to have been admitted. It fairly appears that the witness was in position to know the cost of machine work and packers and since no one testifies to making out the $60 invoice or why, if it referred to the whole tool, it should be described as a "rubber packer 4" x 6⅝"," language which is appropriate to a frustroconical rubber mass of diameter 4" at the small end of 6⅝" at the larger, but which does not well describe a metal tool several feet long with no such metallic dimensions. The machinist Butler mainly corroborates Simmons, though he admits that the working hours between the making of the blueprint and the receipt on the $60 invoice were hardly sufficient for the machine work, and that the time of himself and the machines at the usual rate would be worth several times $60. The

former bookkeeper and the foreman of the machine shop both corroborate the ex-secretary-treasurer and Carter. No one says that more than one tool was ever made there. Philp got to the trial late and was restricted to surrebuttal testimony and did not get to say much. But his blueprint and the correspondence with his patent lawyers in Washington are in the record. We agree with the trial judge that Philp and Carter abandoned their interest in the whole matter, but we cannot think that this bookkeeper, this foreman, and the former secretary-treasurer of the machine shop who have no interest and are not impeached ought to be disregarded. They all fix the date by that of the leaving of the secretary-treasurer, and what he knows must have happened before he left. The blueprint and patent application of Philp went to Washington seven days before he left. Inventors working independently on the same problem have sometimes hit on substantially the same solution; but that in the same town two such, well acquainted with each other, should appeal for help to the same man, go to the same engineer for dawings and to the same shop for a completed tool, and be able somehow to merge both into one without any intercommunication is too much of a coincidence. It seems more reasonable to conclude that Philp's tester with its sleeve valve as shown in his blueprint was not workable, and that it was abandoned, and that Simmons did substitute a better valve —his disc rotary stop-cock—shown in his blueprint, and that the machine shop, after experimenting with the Philp tool, was able to make one for Simmons

more expeditiously than would have been otherwise possible, re-using parts of it. It may even be that the $60 invoice is more for the rubber member than for the tool, for all say that no rubber was ever put on the Philp tool. While this might entitle Simmons to credit for an improvement in the mechanism, the idea of using one string of pipe with a valve to be closed and opened by rotating the pipe to entrap a sample below the packer was the idea of Philp. Though the evidence is not clear and a patent ought not lightly to be upset on such a ground alone, we are satisfied that no wrong is done Simmons and his assignees in denying him a broad and basic patent.

The judgment is reversed and the cause remanded, with direction to dismiss the bill.

IN THE

SUPREME COURT

OF THE

UNITED STATES.

OCTOBER TERM, 1938.

No................

[illegible] H[illegible] and HALLIBURTON OIL WELL [illegible], a corporation,

Petitioners,

vs.

[illegible] OIL CORPORATION, LTD., a corporation, and [illegible] JOHNSTON OIL FIELD SERVICE CORPORATION, a corporation,

Respondents.

CROSS PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT AND BRIEF IN SUPPORT THEREOF.

FREDERICK S. LYON,

[illegible] S. LYON,

H[illegible] S. RICHMOND,

[illegible] West Seventh Street, Los Angeles,

Attorneys for Petitioners.

[illegible]

[illegible], New York City,

[illegible]

[illegible]

TABLE OF CONTENTS.

TABLE OF AUTHORITIES CITED.

IN THE

SUPREME COURT

OF THE

UNITED STATES.

OCTOBER TERM 1938.

No..................

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),

Petitioners,

vs.

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),

Respondents.

CROSS-PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT.

To the Honorable Charles Evans Hughes, Chief Justice, and to the Associate Justices of the Supreme Court of the United States:

Petitioners, Erle P. Halliburton and Halliburton Oil Well Cementing Company, respectfully pray that a writ of certiorari issue to review a decree of the United States Circuit Court of Appeals for the Ninth Circuit, entered July 11, 1938 (petition for rehearing denied September

12, 1938), in a suit (No. 8653) brought by them against respondents, Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation, for infringement of Letters Patent of the United States No. 1,930,987. The defendants in said suit, Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation, have petitioned this Court (No.   , October Term, 1938) for a writ of certiorari to review this identical decree, and the required transcript of record in the case, in two volumes, has been filed in this Court by them. [Opinion, Tr. Vol. I, p. 744; decree, p. 759; order denying petition for rehearing, p. 760.] This is in the nature of a cross-petition for certiorari, to enable petitioners to raise before this Court certain specified questions, which respondents do not seek to raise by their petition.

Statement and Reasons Relied Upon for Allowance of the Writ.

There is a direct conflict between the decisions of two circuit courts of appeal with respect to the validity and scope of the patent in suit. As pointed out in the petition filed on behalf of the respondents, the patent contains (a) method claims and (b) apparatus claims. There is a diversity of opinion below both as to the method and apparatus claims.

In *Johnston Formation Testing Corporation v. Halliburton* the District Court for the Northern District of Texas held both the method and apparatus claims valid and infringed [Tr. Vol. II, p. 215], whereas the Circuit Court of Appeals for the Fifth Circuit held the method claims invalid and the apparatus claims valid but not infringed (88 Fed. (2d) 270).

In the present case, *Halliburton v. Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation,* the District Court held both the method and apparatus claims invalid and not infringed [Tr. Vol. I, p. 43], but the Circuit Court of Appeals for the Ninth Circuit, reversing the District Court as to the method claims, has held the method claims valid and infringed. As to the apparatus claims, the Circuit Court of Appeals affirmed the District Court, holding the apparatus claims invalid (98 Fed. (2d) 436).

The accused method and device involved in both cases are identical.

The questions specified for review in the petition for writ of certiorari filed by respondents, Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation, go only to the validity of the method claims of the patent in suit. Petitioners, by this petition, ask this Court to review also the validity and infringement of the apparatus claims.

Petitioners join with respondents in urging that this is a case entitled to review by this Court under subdivision 5 (a) of Rule 38.*

Petitioners sought a review by this Court of the decision of the Fifth Circuit Court of Appeals, but this was denied at a time prior to the conflicting decision of the Ninth Circuit Court of Appeals. (301 U. S. 691, 15 Sup. Ct. 793.)

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*The right to file any other or further brief in opposition to defendants' petition for certiorari is hereby waived.

Questions Presented.

Petitioners, by this cross-petition, seek a review of the following questions:

(1) Are apparatus claims 9, 10, 11, 12, 13, 14, 15, 16, 17 and 19 of United States Letters Patent No. 1,930,987, valid?

(2) Are such apparatus claims infringed by the accused device employed by the defendants, Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation?

Wherefore, your petitioners, Erle P. Halliburton and Halliburton Oil Well Cementing Company, pray that this petition be granted, and that the aforesaid questions be determined by this Court upon the grant of a writ of certiorari to be issued and directed to the Circuit Court of Appeals for the Ninth Circuit.

Dated Los Angeles, California, November 12, 1938.

Erle P. Halliburton and
Halliburton Oil Well Cementing Company,

By Frederick S. Lyon,
Leonard S. Lyon,
Henry S. Richmond,
Attorneys for Petitioners.

William H. Davis,
Of Counsel.

IN THE

SUPREME COURT

OF THE

UNITED STATES.

OCTOBER TERM 1938.

No................

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),

Petitioners,

vs.

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),

Respondents.

BRIEF IN SUPPORT OF CROSS-PETITION.

I.

Opinions in the Courts Below.

The opinion of the Circuit Court of Appeals for the Ninth Circuit is reported as *Halliburton v. Honolulu Oil Corporation et al.* in 98 Fed. (2d) 436 [Tr. Vol. I, p. 744], and the opinion of the District Court in the same case is reported in 18 Fed. Supp. 58. The opinion of the Circuit Court of Appeals for the Fifth Circuit is reported as *Johnston Formation Testing Corporation et al. v. Halliburton* in 88 Fed. (2d) 270, and the decree of the District Court in that case will be found at Vol. II, p. 215, of the transcript here.

II.
Jurisdiction of This Court.

The jurisdiction of this Court is invoked under Section 240 (a) of the Judicial Code (28 U. S. C. A. 347). The date of the decree sought to be reviewed is July 11, 1938, but the petition for rehearing was not denied until September 13, 1938.

III.
Argument.

As pointed out in the statement of facts set forth in the petition, the Court of Appeals for the Ninth Circuit has in the instant case rendered a decision in direct conflict with the decision of the Court of Appeals for the Fifth Circuit, not only upon the matter of the validity of the method claims of the patent in suit, but upon the matter of the validity and scope of the apparatus claims as well.

It is clear, we think, that the conflict of decisions with respect to the validity of the method claims, brought to the Court's attention on defendants' behalf, calls for the granting of a writ of certiorari.

We think it is equally clear that the conflict with respect to the validity and scope of the apparatus claims should also be resolved by this Court. (Rule 38, paragraph 5, of the Rules of this Court.)

Respectfully submitted,

FREDERICK S. LYON,
LEONARD S. LYON,
HENRY S. RICHMOND,
Attorneys for Petitioners.

WILLIAM H. DAVIS,
Of Counsel.

Due service of the within Cross-Petition and Brief is hereby acknowledged this..........day of November, A. D. 1938.

____

____

Attorneys for Respondents.

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1938

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),
Petitioners,

vs. — No. 466

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),
Respondents.

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),
Cross-Petitioners,

vs. — No. 479

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),
Cross-Respondents.

OPENING BRIEF OF HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION.

A. W. BOYKEN,
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Subject Index

Table of Authorities Cited

Cases

Text Books and Statutes

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, 1938

Honolulu Oil Corporation, Ltd. (a corporation), and M. O. Johnston Oil Field Service Corporation (a corporation), *Petitioners,* vs. Erle P. Halliburton and Halliburton Oil Well Cementing Company (a corporation), *Respondents.*	No. 466
Erle P. Halliburton and Halliburton Oil Well Cementing Company (a corporation), *Cross-Petitioners,* vs. Honolulu Oil Corporation, Ltd. (a corporation), and M. O. Johnston Oil Field Service Corporation (a corporation), *Cross-Respondents.*	No. 479

OPENING BRIEF OF HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION.

Note: This brief having been prepared prior to the printing of the record for use in this Court, all references to the record relate to the pages of the record as made up in the Circuit Court of Appeals, which are indicated by side folio numbers in the record here.

I.

PRELIMINARY.

This cause is here on writ of certiorari to review a decision of the Circuit Court of Appeals for the Ninth Circuit in a patent infringement suit.

Opinions of the Courts below.

The opinion of the Circuit Court of Appeals for the Ninth Circuit is *Halliburton v. Honolulu Oil Corporation et al.*, 98 F. (2d) 436. (R. Vol. 1, p. 744.) Rehearing was denied. (R. Vol. 1, p. 760.)

The opinion of the District Court in the same case is reported in 18 Fed. Supp. 58. (R. Vol. 1, pp. 33-37.)

A writ of certiorari in the above case was granted presumably because of a direct conflict with a previous decision of the Circuit Court of Appeals for the Fifth Circuit, involving the same patent.

The opinion of the Circuit Court of Appeals for the Fifth Circuit is *Johnston Formation Testing Corporation v. Halliburton*, 88 F. (2d) 270. Certiorari was denied. 301 U.S. 691, 57 S. Ct. 793.

Jurisdiction.

The jurisdiction of this Court is invoked under Section 240(a) of the Judicial Code (28 U.S.C.A. §347(a)), and Rule 38, subdivision 5(a), of this Court. The jurisdiction of the Circuit Court of Appeals was under Section 128(a) of the Judicial Code (28 U.S.C.A. §225(a)). The suit is one arising under the patent laws of the United States. Section 24(7) of the Judicial Code as amended (28 U.S.C.A. §41(7))

The decree of the Circuit Court of Appeals for the Ninth Circuit was entered on July 11, 1938, and the petition for rehearing denied on September 13, 1938.

A petition for a writ of certiorari was filed in this Court on November 8, 1938, and a cross-petition on or about November 18, 1938.

Both the petition and cross-petition were granted by this Court on December 19, 1938.

II.

STATEMENT OF CASE.

This is a suit in equity for alleged infringement of United States Letters Patent No. 1,930,987, dated October 17, 1933, applied for by John T. Simmons of El Dorado, Arkansas, and assigned to Erle P. Halliburton of Los Angeles, California. (Plf.'s Ex. 1: R. Vol. 2, p. 4.)

Erle P. Halliburton, the patent owner, and Halliburton Oil Well Cementing Company, the exclusive licensee, were plaintiffs* in the trial Court. Honolulu Oil Corporation, Ltd., a producing oil company, and M. O. Johnston Oil Field Service Corporation, owner of the accused devices and employed by the oil company to make tests, were defendants in the trial court below.

The patent is entitled "Method and Apparatus for Testing the Productivity of Formations Encountered

*For convenience the parties will be referred to herein as plaintiffs and defendants.

in Wells" and contains altogether nineteen separate claims, of which only twelve claims, viz., 8 to 19, both inclusive, were in suit. Claims 8 and 18 are for an alleged method, while the ten remaining claims are for an apparatus.

The patent relates to testing the productivity of formations encountered in drilling oil wells when such wells are drilled under the so-called rotary method. The operation requires the isolation of the formation to be tested from the remainder of the well. This is accomplished by means of a packer, attached to a drill pipe having an inlet at its lower end, such pipe adapted to be inserted in a well hole. The packer, when set, relieves the isolated area from the hydrostatic pressure of the rotary mud and other fluids above, and permits the formation fluid, whether oil, water, gas or the like, to flow from the isolated area through the inlet and into the empty drill pipe which becomes the testing chamber. Such chamber is established in the drill pipe and extends from the formation area to the top of the well hole.

When the formation pressure is sufficiently high, the fluid flows upward through the drill pipe (testing chamber) and the productivity of the formation is tested at the top of the well hole, as in the case of a flowing well, without the necessity of entrapping a sample or removing the apparatus for testing purposes. According to the Simmons patent this is the preferred form. (Patent, p. 1, line 109 to p. 2, line 5; p. 3, lines 5-83.)

When the formation pressure is insufficient, so that the fluid will not flow upward through the drill pipe to the top of the well hole, a sample may be entrapped by closing a valve, and the entire apparatus lifted from the well hole to the surface, for the purpose of examining the sample. (Patent, p. 3, lines 80-91.)

The apparatus therefore consists of (1) a pipe having an inlet at its lower end, (2) a packer carried by said pipe, and (3) a valve for closing the inlet so as to entrap a sample, should the formation pressure be insufficient to send the fluid through the inlet and upward in the drill pipe to the top of the well hole.

In short, the Simmons patent in suit attempts to claim the foregoing apparatus and the method by which it is intended to be used.

The District Court of the United States for the Southern District of California, in the instant case, held the ten apparatus and the two method claims in suit to be invalid and not infringed.

On appeal, the Circuit Court of Appeals for the Ninth Circuit affirmed the District Court as to the ten apparatus claims, and held them to be invalid because anticipated by the previous disclosure in an earlier patent to Benjamin Franklin, No. 263,330 (R. Vol. 2, p. 347) issued on August 29, 1882, forty-four years before the Simmons patent application was filed. The Franklin patent showed the same combination of (1) pipe; (2) packer and (3) valve, as that described and claimed in the patent in suit. The Court, however, reversed the lower court's decree as to the two method claims, and held them valid and infringed.

The anomalous situation is presented that although the Simmons testing device is anticipated and old in the well testing art, and therefore available to the public without the payment of tribute, still when such testing device is actually used in precisely the manner and for the very purpose in which it was intended to be used, such use is enjoined in the Ninth Circuit under the opinion and decree here under review. In effect the so-called method claims dominate the situation and actually give the patent owner a monopoly in the use of an old device.

We have been unable to find any other reported patent decision by either this Court or a Circuit Court of Appeals, where the apparatus claims of a patent have been held invalid, yet the method claims of the same patent, describing the manner in which the apparatus was designed and intended to be used, were held valid and infringed. In that respect this case comes here as one of first impression.

The finding by the Circuit Court of Appeals for the Ninth Circuit, that method claims 8 and 18 are valid, is in direct conflict with the earlier decision of the Circuit Court of Appeals for the Fifth Circuit, decreeing the same method claims 8 and 18 invalid.

The defendants, although different parties, in both cases used the same device for testing oil wells, and the accused method by which the devices were used was also the same. The record in the cases, including exhibits, was substantially the same. Certain fact testimony regarding derivation of the invention by the patentee Simmons from one Philp (88 F. (2d.) 270. 273), was omitted in the instant case, but important

additional evidence further invalidating the patent in suit, does appear and was not in the Fifth Circuit case.

Presumably because of a direct conflict of decision between the two Appellate Courts as to method claims 8 and 18, this Court granted our petition for a writ of certiorari, which is in the first case above entitled, No. 466.

No real conflict of decision exists between the two Appellate Courts as to the ten apparatus claims, and defendants were not aggrieved by reason of the decision in respect thereto, for which reason those claims were not included in the scope of the review prayed for in our petition.

Thereafter, a cross-petition for a writ of certiorari was filed by respondents to the original petition, seeking to extend the review of this Court by including the ten apparatus claims, on which merely a conflict of opinion and not of decision exists, with the two method claims on which the conflict is apparent. This Court also granted the cross-petition, which accounts for the second case, above entitled as No. 479.

On final hearing, this Court may conclude that the cross-petition was improvidently granted and that the review should be limited to the validity and infringement of the method claims, raised by the original petition, on which a true conflict exists between courts of concurrent jurisdiction. *Layne & Bowler Corporation v. Western Well Works*, 261 U.S. 387, 43 S. Ct. 422.

For convenience, the briefs herein are entitled in both proceedings which are argued together, since the entire patent is now before this Court.

III.

ASSIGNMENT OF ERRORS.

The Circuit Court of Appeals for the Ninth Circuit was correct in concluding that the ten apparatus claims were invalid but erred in deciding that method claims 8 and 18 were valid, for the following reasons:

1. The method claims merely describe the function of an apparatus, designed and intended for a particular use.

2. The method claims lack invention over Franklin Patent No. 263,330, in view of the prior art.

3. The method claims describe, at most, only a different use for the old device disclosed in the Franklin patent, which different use is itself old.

4. The method claims depend for their novelty upon mechanical limitations, expressly placed there to avoid the prior art.

5. The method claims are not the subject matter of patent protection at all.

6. The claims are not infringed, even though valid, because defendants employ a structure and mode of operation different from that disclosed in the patent in suit.

IV.

SUMMARY OF ARGUMENT.

Structure and operation of the patented device.

The principal elements of the Simmons patented device are a drill pipe having a perforated nipple (strainer) at its lower end, a wedge-shaped (rat hole) packer carried by the pipe, and a valve manipulated from the surface of the well.

Simmons tester a failure.

Only three tests were made and the tool was never used commercially. The later Halliburton "Stop Cock and Gear" and "J-Slot" testers resemble the accused device and are a wide departure from the tool shown in the Simmons patent.

Apparatus claims held invalid.

In the Ninth Circuit the claims were held invalid while in the Fifth Circuit they were held not infringed because the patent was limited to the apparatus disclosed. But in the Fifth Circuit the Court seriously doubted their validity, believing Philp rather than Simmons to be the alleged inventor.

The art prior to Simmons.

The prior patent art, and Carll, Peckham and Chamberlin publications, disclose separately and in combination, a pipe, packer and valve, used for insertion in an oil well. The Cox and Edwards patents relate to testing rotary drilled oil wells. The elimination of a second string of pipe used for circulation does not constitute invention. Plaintiffs and defendants both use means for reestablishing circulation.

Franklin patent alone a complete anticipation.

Franklin discloses every element of the Simmons structure. Although intended for regulating the flow of oil wells, it can, without change, be used for testing. Two forms of valve are shown; they do not leak and the tool will entrap a sample. It was successfully operated in California.

Casing and formation tests.

In a casing test the packer is set against the casing walls, whereas in a formation test it is usually seated on top of the "rat hole". The patent in suit is limited to formation tests and the claims were expressly amended in that respect.

The method claims merely describe the function of an apparatus designed and intended for a particular use.

A comparison of the method claims with corresponding apparatus claims shows that the former merely describe the function or effect of the apparatus embraced in the latter claims. Manual operation was required with both the Franklin and Simmons devices.

The method claims lack invention over Franklin Patent No. 263,330 in view of the prior art.

If a process is the mere function of an apparatus, a prior apparatus, capable of performing the same function, is an anticipation. The intended method of operating the Franklin tool, if used for testing, is the same as the method claimed by Simmons.

The method claims describe, at most, only a different use for the old device disclosed in the Franklin patent, which different use is itself old.

A new or different use of an old apparatus is not invention. It required no change in the Franklin tool to adapt it to well testing. When the Franklin patent expired, the public was entitled to use that device for any purpose to which it could be put. Other prior patents show oil well testers which entrap a sampl

The method claims depend for their novelty upon mechanical limitations, expressly placed there, to avoid the prior art.

The file wrapper shows that after several rejections, mechanical limitations were inserted in the method claims. They now depend for their novelty on those limitations. No invention exists over the method disclosed in the Cox and Edwards patents.

The method claims are not the subject matter of patent protection at all.

To be patentable, a method must relate to a tangible product which is changed in some useful manner. The operation of an oil well tester, which entraps a sample and brings it to the top of the well, is not an "art", within the meaning of the statute.

The claims are not infringed, even though valid, because defendants employ a structure and mode of operation different from that disclosed in the patent in suit.

The claims, if valid at all, must receive a narrow interpretation and defendant Johnston's tester, made under its own patents, is differently constructed and operated, and is therefore no infringement. Plaintiffs did not prove use by defendant Honolulu Oil Corporation.

The Court's opinion.

It is erroneous in respect to the method and largely based upon the finding that a new use for an old device is patentable as a method. *Lawther v. Hamilton* is not applicable and the proper rule is stated in *Richards v. Chase.*

Conclusion.

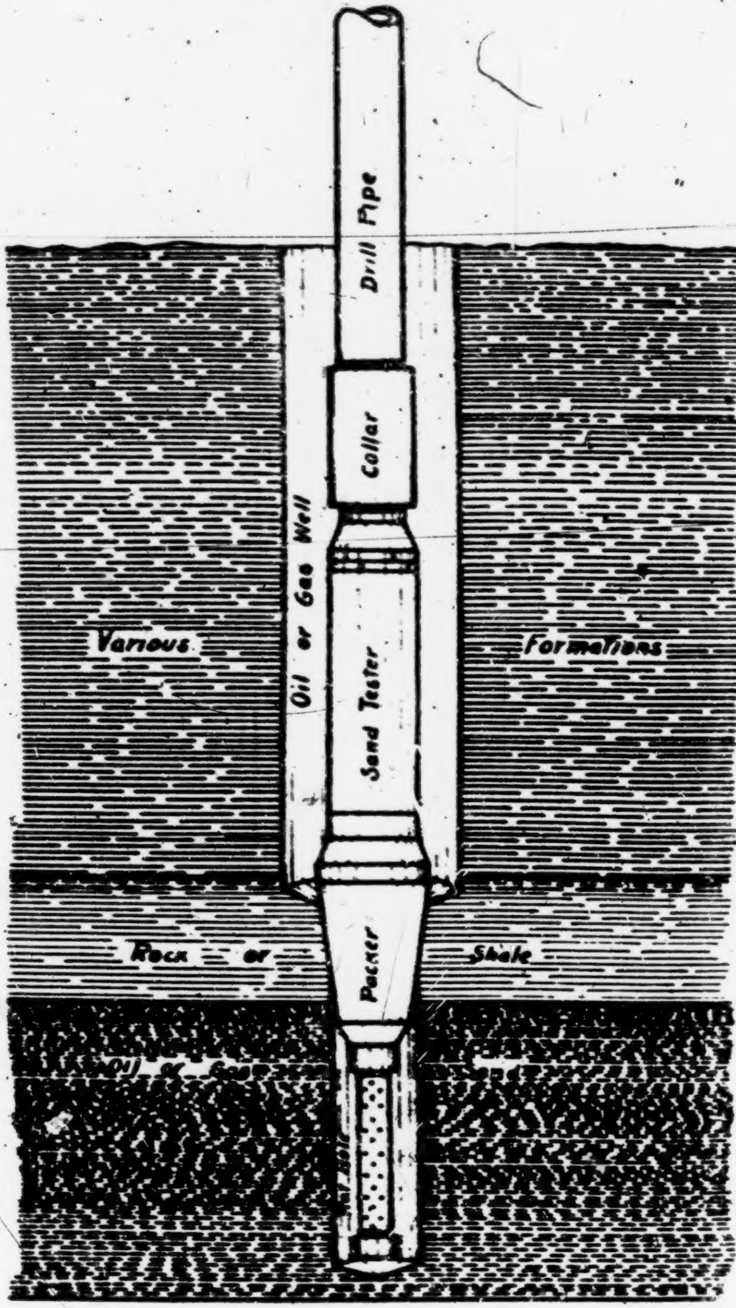
With the knowledge of Cox, Edwards and the other prior art at hand, it did not require invention to use the Franklin tool for well testing. All the claims in suit, for that additional reason, are invalid.

V.

ARGUMENT.

STRUCTURE AND OPERATION OF THE PATENTED DEVICE.

The device shown and described in the Simmons patent consists of a drill pipe, having a perforated nipple (called a "strainer") at its lower end, the pipe adapted to be lowered into a well hole with the perforations projecting into an uncased extension of the well bore, having a reduced diameter (called a "rat hole"); a wedge-shaped packer, carried by the pipe, the packer pressing against the formation by seating on the upper shoulder of the "rat hole" so as to isolate what is in the "rat hole" from the hydrostatic pressure of the rotary mud above the packer; and a valve manipulated from the surface of the well when the packer is seated, to either open or close the inlet between the perforations and the interior of the drill pipe.


Drill Pipe
Collar
Oil or Gas Well
Sand Tester
Various
Formations
Rock or Shale
Packer

In operation, the ordinary drill pipe and closed valve structure are first lowered into the well, so that the perforated nipple enters the "rat hole"; the packer is firmly seated at the top of the "rat hole"; the pipe is then rotated to open the valve which enables the fluid from the "rat hole" formation to enter the drill pipe; and finally the pipe is rotated again in the reverse direction to close the valve. The sample to be tested is either obtained at the top of the well hole, if the formation pressure is sufficient to send it that high through the open valve and pipe, or is entrapped in the drill pipe itself, above the closed valve, when the entire apparatus is withdrawn from the well hole.

The packer, when seated, performs the double purpose of (1) separating the isolated area from the remainder of the well hole, and (2) firmly holding the lower valve portion against rotation, so that when the drill pipe carrying the upper valve portion is manually rotated a quarter turn, from the top of the well, the valve is opened or closed according to the will of the operator.

The structure and mode of operation are more fully explained in the patent in suit (Plffs. Ex. 1; R. Vol. 2, p. 1) and also in the opinion of the Ninth Circuit Court of Appeals herein. The illustration on the opposite page (Plffs. Ex. 11; R. Vol. 2, p. 223) shows the bottom of a well, drilled through certain strata, with the wedge shaped packer seated at the top of the "rat hole". A model of the Simmons device is in evidence. (Defts. Ex. L.)

SIMMONS TESTER A FAILURE.

The Simmons testing device, in the form shown in the patent drawing, was never commercially used. Only three tests were made with the tool. (Plffs. Ex. 9.) One of these was a failure. (R. Vol. 1, p. 592.) The other two were experiments. All the tests were made in the year 1926, since which time the device obscurely reposed in a safe, except during patent litigation. (R. Vol. 1, p. 134.) Simmons went to South America, and apparently forgot all about his invention. Under such circumstances, the patent should be accorded a strict and narrow interpretation according to the Ninth Circuit Court of Appeals. *Cocks v. Rip Van Winkle Wall Bed Co.*, 28 F. (2d) 921.

The District Court herein, found, as a matter of fact, that the Simmons device was a failure, saying:

> "It further fairly appears that the patent in suit was in itself an impractical device. No actual commercial use has been shown. The inventor himself within a month after the patent was taken over by the present owner was employed to devise improvements in the valve structure." (R. p. 37.)

About nine months after the first Simmons test, and on December 28, 1926, Halliburton, assignee of the patent in suit, filed an application for a patent on a different form of testing device, termed the "Stop Cock and Gear" tester. (R. Vol. 2, pp. 312-313.) This application was rejected by the Patent Office on several prior patents, particularly the Franklin patent and Simmons' British patent. In order to overcome the Simmons British patent, similar to the United States patent in suit, Halliburton, through his present

attorneys, argued that the Simmons device was unsatisfactory, in that it stuck when rotation was attempted, by reason of the pressure in the well, and that it required a "large amount of study and experimentation" to design a valve and bearing that would work. (R. Vol. 2, p. 297.) The application was again rejected and finally abandoned. The "Stop Cock and Gear" device was, however, commercially used to some extent.

More recently Halliburton commenced using the so-called "J-Slot" tool, in which a large compression spring was employed. (R: Vol. 2, pp. 224, 315.) It closely resembles the accused Johnston tester, and was a wide departure from the Simmons tool, shown and described in the patent. It is the "J-Slot" form of testing tool, devised by Halliburton and not by Simmons, which attained some measure of success.

Commercial success of the patent in suit, so as to benefit plaintiffs, must be confined to the device shown and described in such patent. *Duer v. Corbin Cabinet Lock Co.*, 149 U.S. 216, 13 S. Ct. 850.

APPARATUS CLAIMS HELD INVALID.

The only Simmons apparatus claims in suit were numbered 9, 10, 11, 12, 13, 14, 15, 16, 17 and 19. These ten claims and their predecessors were twice rejected by the Patent Office examiner as anticipated by earlier patents, and rewritten in an effort to differentiate or narrow them. As first presented, the application embodied no method claims, but these were later added by new counsel employed.

Both the District Court and the Circuit Court of Appeals, in the present case, held the ten apparatus claims invalid, primarily on Franklin patent No. 263,330 of August 29, 1882. (R. Vol. 2, p. 347.)

The Circuit Court of Appeals for the Fifth Circuit, in the earlier case, held similar views respecting the apparatus claims, but preferred to base its decision on non-infringement. That Court, after considering the same prior patents as those considered in the present suit, concluded that the apparatus claims could not be "sustained in all their breadth, but must be limited to the *form of apparatus disclosed*"* in the patent, which did not cover "a monopoly of all single string testers as here claimed". The patent, said the Court, "is not a basic and pioneer invention". Since the accused Johnston device (same as here in suit) did not embody the Simmons valve and manner of actuating, the "means of trapping and withdrawing the sample is substantially different from those disclosed by Simmons", wherefore the Court concluded there was no infringement of the ten apparatus claims.

The two Circuits are in substantial accord as to the effect of the prior art on the apparatus claims. The Ninth Circuit Court, with additional prior art before it, held them invalid; while the Fifth Circuit interpreted them so narrowly that the alleged invention practically vanished, and so found no infringement. Whichever view is taken, the accused device, radically different from that of the patent in suit, and covered by its own patents (R. Vol. 2, pp. 448-479), should be

*Italics throughout brief, whether appearing in quotations or not, may be considered as ours.

free of the charge of infringement and open to use without payment of tribute.

Although the decision of the Fifth Circuit rests on the grounds we have stated, still the Court added: "we have *grave doubt* that Simmons is the original and sole inventor of the method and apparatus sought to be patented", the doubt being predicated on fact testimony, not directly in the present suit, establishing one Philp, rather than Simmons, as the alleged inventor. Said the Court: "the idea of using one string of pipe with a valve to be closed and opened by rotating the pipe to entrap a sample below the packer was the idea of Philp." A full discussion of this fact testimony appears in the opinion and a copy of the testimony itself is in the present suit (Plffs. Ex. 5; R. Vol. 1, p. 586) but on account of its bulk, has not been printed in the book of exhibits.

THE ART PRIOR TO SIMMONS.

Before addressing ourselves specifically to the Franklin patent, we should like to consider briefly the alleged invention, both as an apparatus and a process, in its relation to the prior art generally, at the time such invention is said to have been made. It is well summed up in the Fifth Circuit Court opinion, reading in part as follows:

> "Packers and pipes with valves in them have long been in use to get what is below the packer free from what is above and without removing what is above. Whether a large quantity is taken from a finished well or a small sample from an

unfinished well does not materially alter the method nor the function of the elements used. There has always been water encountered in oil wells; and the drilling fluid is only very muddy water voluntarily put and kept in the well for special reasons instead of running in from natural sources. Expansible and removable packers with pipes through them to reach the oil, gas, or other desired fluid beneath are shown in the Stewart patents, No. 171,589, December 28, 1875, and No. 230,080, July 13, 1880. 'Rat-hole' packers set by the weight of the piping pressing them down and removable by simply lifting them are shown in Koch, No. 208,610, October 1, 1878; Bloom, No. 785,933, March 28, 1905, and McCready, No. 1,522,197, January 6, 1925. The Cooper patent, No. 1,000,583, August 15, 1911, shows a collapsible packer used to separate water above from what is to be gotten below. The pipe carries a valve to be opened and shut from the surface, but the device is complicated. We find the simplicity of the Simmons method, along with all its operations, reasonably disclosed in the old patent to Franklin, No. 263,330, August 20, 1882."

All the patents mentioned, except Stewart, are in the present record, which additionally includes the reports of Carll and articles by Peckham and Chamberlin, appearing in scientific publications, showing and describing the combination of a pipe, carrying a packer, inserted in a flowing well, at least as early as the year 1880.

The report of John F. Carll, published in 1877 (Defts. Ex. I-1, R. Vol. 2, p. 396), refers to "Armour's water packer" (R. p. 424) and an illustration of such

packer is shown in Plate XXXIX of the report, Fig. i (R. p. 428), and a model in evidence. (Defts. Ex. J.) It is said in the report that such packers "came into general use about the year 1875" (R. p. 424), some seven years before the Franklin patent application was filed. The report also says that the packer "can be introduced on the tubing at any point desired". (R. pp. 422-423.) It was so used to confine the oil and gas in the formation and force it through the restricted opening of the tubing with sufficient pressure.

In an article by S. F. Peckham, published in 1884, reference is made to the same John F. Carll, and Plate VI appears in the article, showing the use of a packer, Fig. 4 (reproduced opposite page 25 of this brief), on a tube in a flowing well as it existed in 1880. (R. Vol. 2, p. 440.) Referring to a description of this plate, the statement is made that "these packers are of rubber". (R. Vol. 2, p. 440.) The article clearly shows and describes a rubber packer at the lower end of the tubing, above the perforations through which oil was to enter, the packer pressing against the formation, forming a seal between the isolated producing area and the well-hole above.

The Chamberlin article (R. Vol. 2, pp. 441, 443) shows and describes seed bags, rubber disks and other forms of packers used for regulating the flow of fluid by confining it to a comparatively small tube. Early tests are also described and illustrated, made with a pipe and packer when there was sufficient pressure in the formation tested to cause the fluid to flow to the surface. (R. Vol. 2, pp. 444-447.)

The structure of the Franklin patent, which we shall fully discuss under our next heading, is a device suitable for controlling and regulating the flow of oil wells, rather than specifically for testing such wells. Testing, however, is controlling the flow of a well, so as to obtain merely a sample, either at the top of the well or by entrapment within the hole itself.

But testing devices for entrapping a sample were also old before Simmons, as shown in patents to Cooper, No. 1,000,583; Cox, No. 1,347,534; and Edwards, No. 1,514,585. (R. Vol. 2, pp. 359, 365 and 386.) No new problems were involved in lowering testing apparatus into the drilling fluid used in the more recent rotary drilling method, rather than into the muddy water encountered in the former method of drilling. As the Court in the Fifth Circuit said: "drilling fluid is only very muddy water". Even plaintiff Halliburton conceded that "it doesn't make any difference what the fluid is" in the well (R. Vol. 1, p. 217), and a similar statement is made by Simmons himself. (Patent, p. 3, lines 43-48.)

Cox patent No. 1,347,534, and Edwards patent, No. 1,514,585, are in the very art of testing strata in deep rotary drilled oil wells by sample taken through the drill pipe. The apparatus, designed for lowering into rotary drilling fluid, had two strings of pipe, one for obtaining the sample and the other for circulating rotary fluid, if desired, while the testing operation was in progress. During the prosecution of the Simmons patent application, fifteen claims were cancelled by applicant on the Edwards patent reference alone. (R. Vol. 2, pp. 66, 68.)

The theory of using two strings of pipe was that rotary drilling fluid should pass down through the outer string and then move upward in the annular space between it and the well hole, while the testing sample would be entrapped in the inner string. The object was to maintain circulation of the drilling fluid in order to prevent crumbling of the walls of the well, down over the packer, while the test was being made.

The Simmons patent discloses only one string of pipe, just as in Franklin, with no provision for maintaining or reestablishing the circulation of drilling fluid during the testing operation. The absence of a second string of pipe, for circulation, in the Simmons apparatus, was not considered invention in the Fifth Circuit, the Court saying:

> "Edwards thought there were advantages in having more than one pipe string, in which he may be wrong, but again in view of the oil well art we do not think that the omission of the Edwards second pipe to maintain circulation can be said to involve such invention as to give a monopoly of all single string testers as is here claimed."

However, plaintiffs' present commercial device, referred to as the "J-Slot" tool (R. Vol. 1, pp. 172-174), and also defendants' accused tester (R. Vol. 1, pp. 237-239), actually provide for maintaining or reestablishing circulation, if deemed necessary by the operator. True, the provision for circulation is effected by means of a more complicated device with additional valves, and not by a second string of pipe extending to the top of the well hole. But the point is that the ability

to reestablish circulation of drilling fluid is a desirable and indeed a necessary function in the testing apparatus of today. (R. Vol. 1, pp. 527-528, 553, 571.) If the novelty in Simmons is the elimination of circulation, he really made a step backward, rather than forward, because such type of tester, without circulating provision, is not now used.

Halliburton's original application for patent covering the "Stop Cock and Gear" device, filed some nine months after the first Simmons test, showed a two-string tester. (R. Vol. 1, pp. 691-692.)

In exploiting their present J-type testing tool, plaintiffs boast in their advertisements that: *"Circulation can be established whenever necessary without opening tester."* (R. Vol. 2, p. 315.)

Burr & Wakelee patent No. 68,350 (R. Vol. 2, p. 329) and Lyon patent No. 46,124 (R. Vol. 2, p. 317) show oil well testing devices which, though operating in well fluid, did not maintain circulation. The Cooper and Franklin patents, previously referred to, likewise show devices suitable for testing oil wells, but making no provision for circulation.

FRANKLIN PATENT ALONE A COMPLETE ANTICIPATION.

The Franklin patent, No. 263,330, dated August 29, 1882 (R. Vol. 2, p. 347), discloses every element of the Simmons structure, and while intended as a device for controlling and regulating the flow of oil wells, it can without modification also be successfully used for testing oil wells. That was demonstrated by

SIMMONS

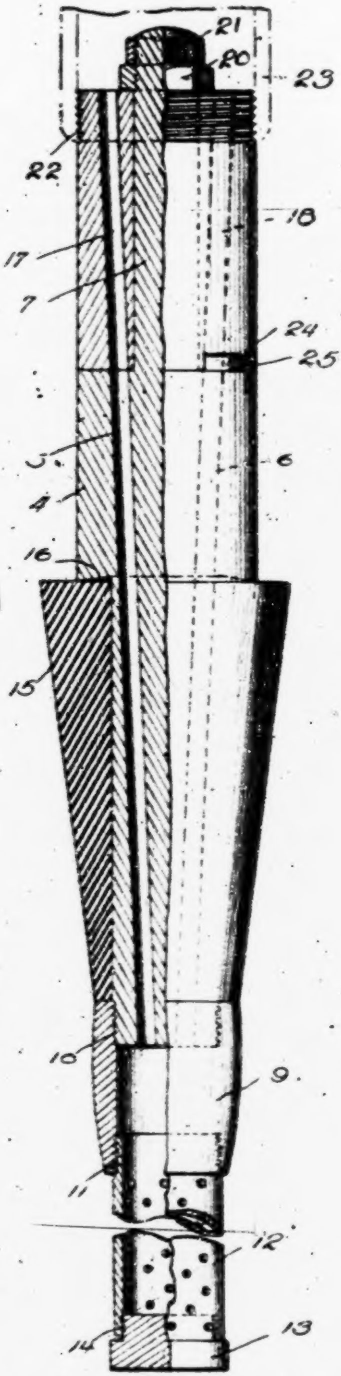


FIG. 1

FRANKLIN

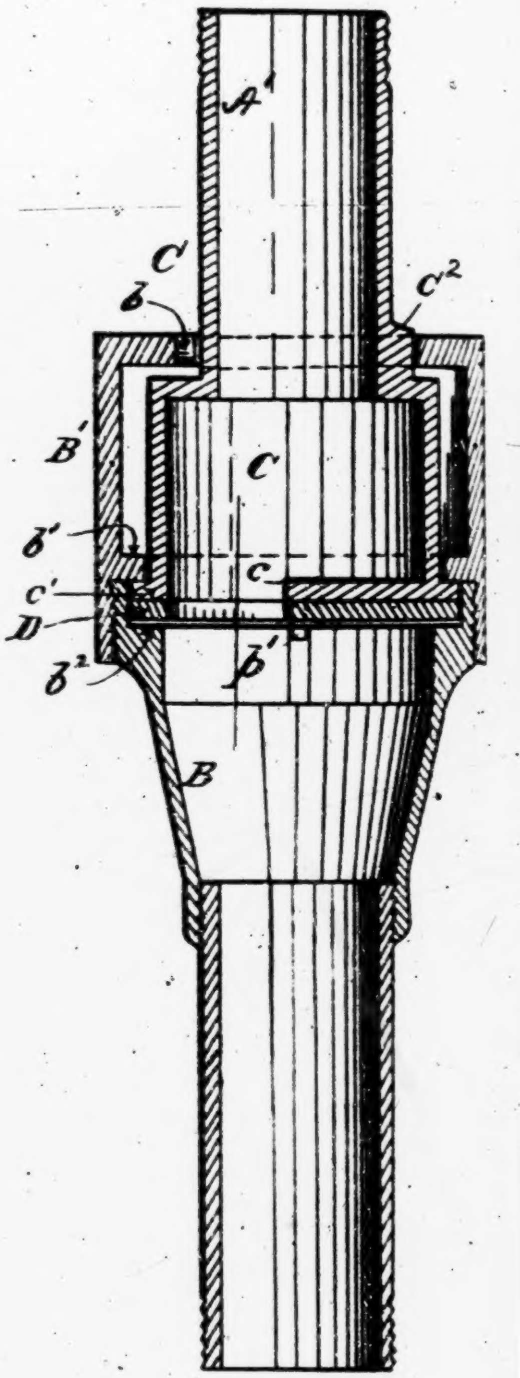


FIG. 2

the actual use in California of a full size Franklin device (Defts. Ex. K) used for testing purposes, which device, the court held, "recovered an entrapped sample". The satisfactory operation was described by the witnesses Howard (R. Vol. 1, pp. 517-526) and Abbett (R. Vol. 1, pp. 358-369) and is evidence in this suit which was not in the previous Fifth Circuit case. A model of Franklin's tool is also in evidence. (Defts. Ex. M.)

The Franklin device, in all essential respects, is the same as that shown in the Simmons patent. For convenience we are placing in juxtaposition on the opposite page, Fig. 1 of the Simmons drawing and Fig. 2 of Franklin. Both show (1) a pipe with an inlet at its lower end and (2) a valve for closing the inlet, two of the three major elements of the claims in issue. Only the (3) packer is not shown in the Franklin drawing, its function being well known at that time, but such packer is included in the combination, as evidenced by the following language of the patent description:

> "My invention relates to devices for regulating or controlling the flow of oil-wells; and it consists in providing a device which can be connected with the tubing of the well * * * at a point above the *packer* * * *" (Patent, p. 1, lines 12-17.)

A patentee need not describe that which is well known in the art. He may begin by describing what he has done that is new. "That which is common and well known is as if it were written out in the patent and delineated in the drawings." *Webster Loom Co. v. Higgins*, 105 U.S. 580, 586.

Turning to the knowledge of those skilled in the art at the time of Franklin, we find that packers were already old and well known. Particularly, we point to the various packers shown and described in the reports of John F. Carll (Defts. Ex. I-1, I-2 and I-3), especially the diagram of a flowing well of 1880. Fig. 4 (R. Vol. 2, p. 440), included in the article published by S. F. Peckham, portions of which are in the present record. (Defts. Ex. I-2.)

The Circuit Court of Appeals for the Fifth Circuit says that the Franklin patent mentions a packer and that "one must be used, for without it oil would never flow through the pipe as desired and there could be no use of the valve to control the flow. The packer is necessary to prevent the escape of gas and build up pressure to make the oil flow."

The Circuit Court of Appeals for the Ninth Circuit found that "the Franklin device contemplated the use of a packer below the valve to close the upper part of the casing or well from the lower".

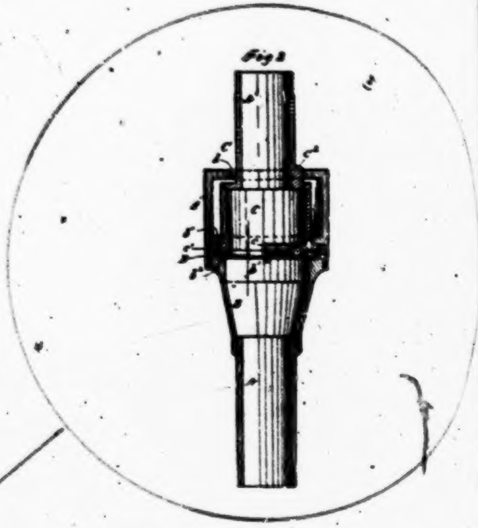
The conclusion is irresistible that Franklin used a packer on the well tubing below the valve, to close the space between the tubing and the walls of the well hole or casing, so as to permit the gas from the producing area below the packer to build up, or, as Franklin says, "for the purpose of allowing the gas to obtain a head" (Patent, p. 1, lines 38-39), whereupon the valve was opened and the oil and gas flowed upward through the tubing. Only by locating the packer on the oil tubing can this effect be obtained. The patent supports no contrary conclusion. Such a packer also serves the purpose of cutting off water or

(No Model.)

B. FRANKLIN.

DEVICE FOR CONTROLLING AND REGULATING THE FLOW OF OIL WELLS.

No. 263,330. Patented Aug. 29, 1882.



dirt above from the oil below, though Franklin does not mention this obvious function.

Finally, 'a packer on the tubing of the Franklin device, below the valve, is an absolute necessity to hold the lower portion against rotation, for opening and closing the valve. The packer, when seated, firmly presses against the walls of the formation, holding the lower valve structure from rotation, thus permitting the upper structure to turn, by manual operation, from the top of the well. The Franklin valve could not be rotated, and the device would be inoperable, if the packer were not located on the tube.

We have, therefore, in the Franklin patent, the combination of three elements making up the Simmons apparatus, to-wit, pipe, packer and valve.

Since the Franklin device, in the words of the patentee, "can be connected with the tubing of the well * * * at a point *above* the packer", we have illustrated on the opposite page the location of such a Franklin valve, connected with the tubing (drill pipe) of a flowing well in the year 1880, for the purpose of controlling or regulating the flow through the tubing or drill pipe.

What new invention is there in the Simmons patent, over the old Franklin valve, inserted on the pipe of a flowing well at a point above the packer, as shown in the illustration and known to the oil well industry over forty years before the Simmons patent application was filed?

The Simmons apparatus is merely the Franklin valve inserted in the old flowing well of 1880.

If it be suggested that Simmons discloses a device for testing an oil well, whereas Franklin shows substantially the same device for regulating and controlling the flow of such a well, the obvious answer is, that it is immaterial for what purpose the device is used, when the apparatus claims are considered. The different names by which a thing is called, whether "tester" or "regulator", should have no effect in distinguishing two mechanical devices, in order to avoid anticipation. *Machine Co. v. Murphy,* 97 U.S. 120, 125; *Brush v. Condit,* 132 U.S. 39, 49.

The testing of an oil well and regulating its flow are in the same art, or are at least in analogous arts, as found by the Appellate Courts below. Testing is merely flowing a well temporarily for obtaining a sample. The quantity of sample depends upon the formation pressure of the selected area, isolated from the remainder of the well. If it is sufficient to completely fill the drill pipe to overflowing, then a flowing well results and the sample can be obtained at the top of the well hole. On the other hand, according to the prior art, if the pressure is insufficient, so that the drill pipe is only partially filled, the valve in the testing device may be closed, and the drill pipe withdrawn, in order to obtain access to the entrapped sample (Cox patent); or the fluid removed by pumping (Cooper and Edwards patents), bailing (Cooper patent), or artificial pressure. (Lyon patent.)

The patent in suit states:

"In the preferred form of the invention, such empty chamber is established extending from

the formation tested to the top of the well, whereby, in certain cases when the cognate fluids of the formation are under sufficient pressure, the well may commence producing through this conduit." (Patent, p. 1, line 109 to p. 2, line 5.) * * *

"It will be obvious that if the pressure of the cognate fluids within the formation is sufficiently high that production may then take place through the casing 23." (Patent, p. 3, lines 80-83.)

The Fifth Circuit Court said that Franklin "expected to get what was below the packer by a natural flow, just as Simmons in his disclosure says it is to be preferred".

The Ninth Circuit Court specifically found that the Franklin device was in "an analogous art".

Franklin, therefore discloses an apparatus which may be used in making an oil well test according to the method preferred by Simmons.

The Franklin device can also be used for entrapping a sample and withdrawing it from the well, according to the second method of Simmons. If those using the Franklin device, desired to make a test, and the pressure underneath was insufficient to cause the formation fluid to flow to the surface, the valve could be closed and the tubing withdrawn. By so doing, whatever fluid there was in the tubing and above the valve, would be a sample and could be tested in precisely the same manner as when the Simmons apparatus is used.

The Franklin valve includes a disk having a half circle opening, attached to the upper valve structure,

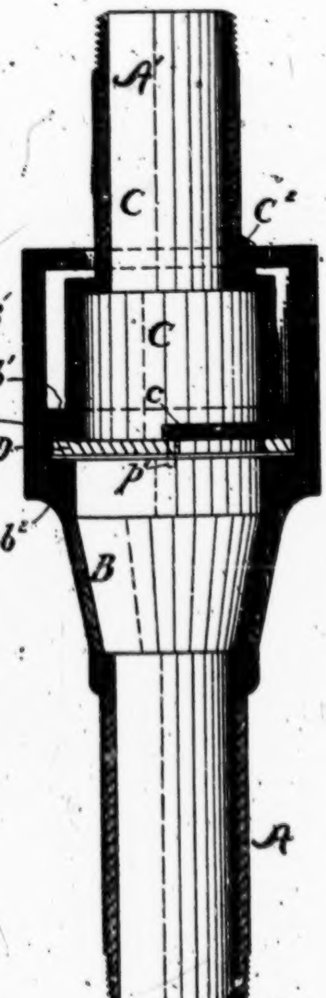
so designed that such opening may register with a corresponding opening in the lower valve structure. The packer on the tubing below the valve, when set, holds the lower valve structure against rotation, so that the upper valve structure may be rotated a half turn in respect to the lower structure, either to open or close the passageway through the two disks. The operation of opening and closing is manually performed at the top of the well hole, the same as in Simmons, by turning the tubing or pipe to which the upper valve structure is attached.

Two forms of lower disk are disclosed in the Franklin patent. The one shown in the patent drawing rests loosely on the shoulder of the lower valve structure. Pins prevent the disk from completely turning around, but permit a slight vertical movement. In the other form, the disk is attached solidly to the lower valve structure.

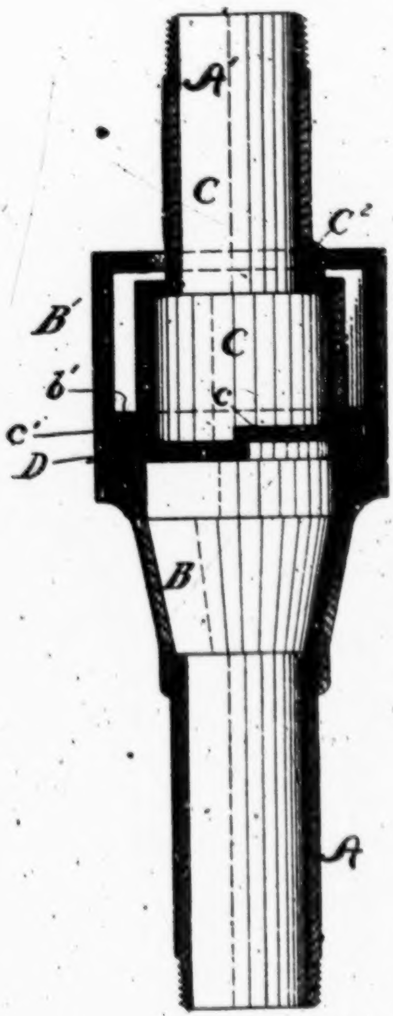
On the opposite page are shown the two valves described by Franklin. We have colored the upper valve structure red and the lower blue. The floating disk, shown in the patent drawing is colored yellow, and because of its "very little play vertically" (Patent, p. 2, line 14), is evidently designed to reduce friction and facilitate rotation. Heavy oil or grease could be inserted between two disks for the same purpose. (R. Vol. 1, pp. 592-594.)

Plaintiffs, in the Courts below, argued that the Franklin device could not retain an entrapped sample, because the floating disk (yellow) of the patent drawing, would cause the valve to leak, and so lose the

PATENT DRAWING



ALTERNATE FORM
DESCRIBED IN PATENT



Such an argument not only finds no support in the patent itself but is directly contrary to the statements appearing therein.

In the type of valve shown in the patent drawing, the floating disk, forming a part of the lower valve structure, is designed to be held in place against the lower surface of the upper disk, as shown, by reason of the pressure of the gas below the packer when set, or by the hydrostatic pressure of the well fluid when the packer is unseated.

But Franklin, although his drawing shows the floating disk, expressly states that his lower disk may be secured to and become a part of the valve. He did not limit his invention, or its description, to the vertically movable disk.

In describing the operation, Franklin says:

> "It will be seen that my device can be operated from the top of the well by turning the tubing, as stated above; that the oil can be shut off by it or allowed to flow at will; that the device can be kept closed while the tubing is being put into the well and then opened, *and can be again closed when the tubing is to be drawn.*" (Patent, p. 2, lines 24-31.)

If the device is operated in the manner intended by Franklin, then the result is inevitable that any fluids which entered the tubing from the formation beneath the packer *would be entrapped* therein and made available to the operator when the device was withdrawn.

In speaking of a certain brittle disk, used in the

keeping the tubing closed while drawing it", and adds:

> "there is no device to my knowledge, except my own, which will *close* the tubing while it is being *drawn*." (Patent, p. 1, lines 33-35.)

Elsewhere in the patent, Franklin says that the valve "can be opened or closed" (p. 1, line 18); that there will be "no leak" (p. 2, line 21); that the flow can be "shut off" (p. 2, line 26) and the valve constructed to "open or close". (p. 2, line 45.) This language all indicates that it was actually Franklin's intention to close the valve while the tubing was withdrawn, if used for testing and not to partially close it, so that the valve would leak and the sample be lost. While he does not mention an entrapped sample, such sample would inevitably result when the device, if used as a tester, is raised from the well with the valve closed.

Moreover, the Franklin tool (Defts. Ex. K), built and operated in the California oil-field for testing purposes, actually recovered an entrapped sample. (R. Vol. 1, pp. 517-526; 358-369.)

True, the Circuit Court of Appeals for the Fifth Circuit, not having before it evidence of the successful operation of the Franklin device, thought that the valve would leak when withdrawn from the well, but added that there would be no invention "to substitute a valve that would not leak for the one that does leak on withdrawal". In the present suit, however, the Ninth Circuit Court, on further evidence of the successful operation of the Franklin device as a tester.

found that the valve "did not leak". Agreeing with the Fifth Circuit decision, the Court adds that "it does not involve invention to tighten what would otherwise be a leaky valve".

The drilling of deep wells by the rotary method has come into extensive use only during the present century, and so Franklin does not mention drilling fluid, or rotary mud, as we know it today. But even under the present rotary method, the consistency of the drilling fluid varies, and sometimes oil, instead of mud, is used. (R. Vol. 1, pp. 685-686.) There was, however, in the days of Franklin, the likelihood of fluids in the well and above the packer, as shown in the Chamberlin report, Fig. 30. (R. Vol. 2, p. 446.) The original use of a packer, particularly on the tubing, was to prevent surface water from passing down into the oil formation, and thus create a hydrostatic head which would prevent the flow of oil into the tubing, as disclosed in the Carll Report. (R. Vol. 2, pp. 409-410; 415-417.)

Halliburton, one of the plaintiffs, in the dual posiition of patent owner and expert witness, testified that if the Franklin device were equipped with a packer and used to test the formation in accordance with the patent in suit, it would infringe the latter. (R. Vol. 1, pp. 687-688.) This is equivalent to an admission that the Franklin patent alone, fully anticipates the patent in suit. *Knapp v. Morss,* 150 U.S. 221, 228, 14 S. Ct. 81, and cases there cited.

Finally, the Appellate Court below said:

> "We conclude that the apparatus claims of the patent in suit were anticipated by the patent to Franklin."

The conclusion, fully supported by the prior art and testimony of witnesses, not in conflict with the decision in the Fifth Circuit, we submit, is correct, and should not be disturbed. *General Talking Pictures Corp. v. Western Electric Co.,* 304 U.S. 175, 58 S. Ct. 849, 851.

CASING AND FORMATION TESTS.

Before examining the Simmons method claims, it is important to understand the purpose and manner in which defendants' apparatus is used.

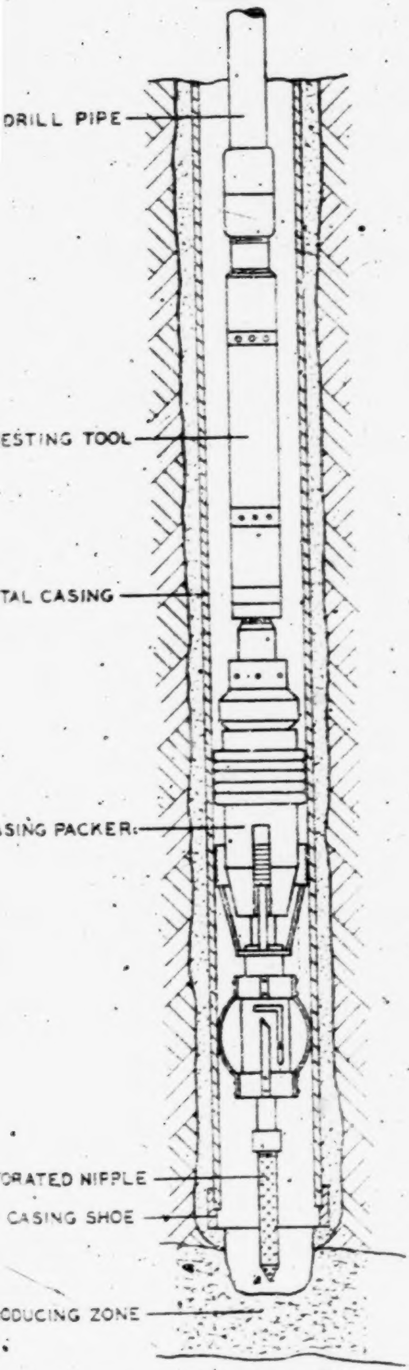
Two types of tests are made with both plaintiffs' and defendants' commercial devices as they are used in the oil fields today. One is commonly termed a "casing" test and the other a "formation" test. About one-third of the accused tests are casing, and two-thirds are formation tests. (R. Vol. 1, p. 215.)

The primary difference between a casing and a formation test is that in the former the packer is set against the interior walls of a metal casing; whereas in the latter the packer is usually seated on top of the "rat hole", as shown in the Simmons patent, but occasionally against the walls of the open hole or formation.

To illustrate these different tests we have reproduced on the opposite page three figures from De-

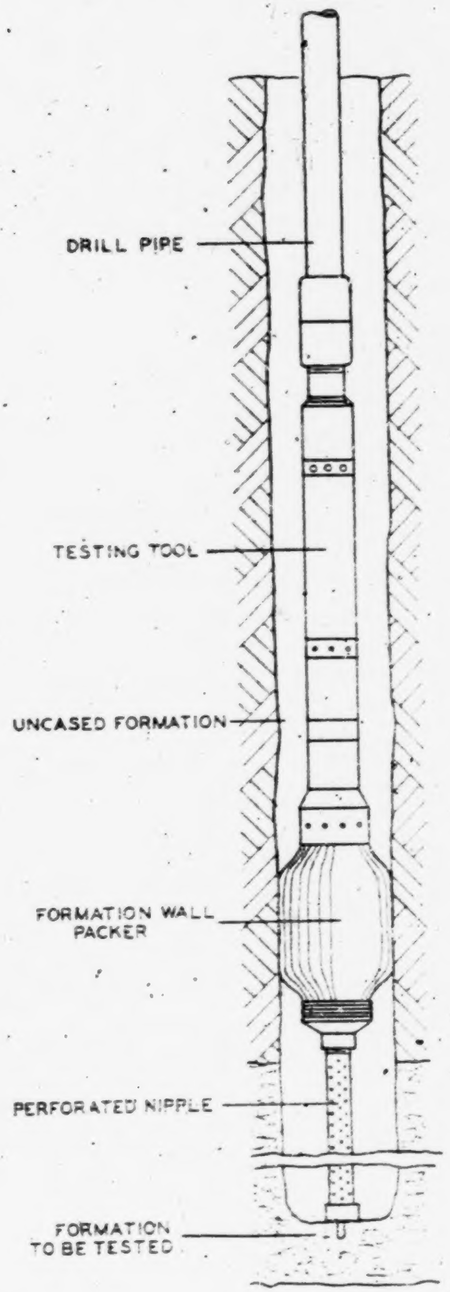
HALLIBURTON OIL WELL CEMENTING CO.
TESTING SERVICE

FIG. 1



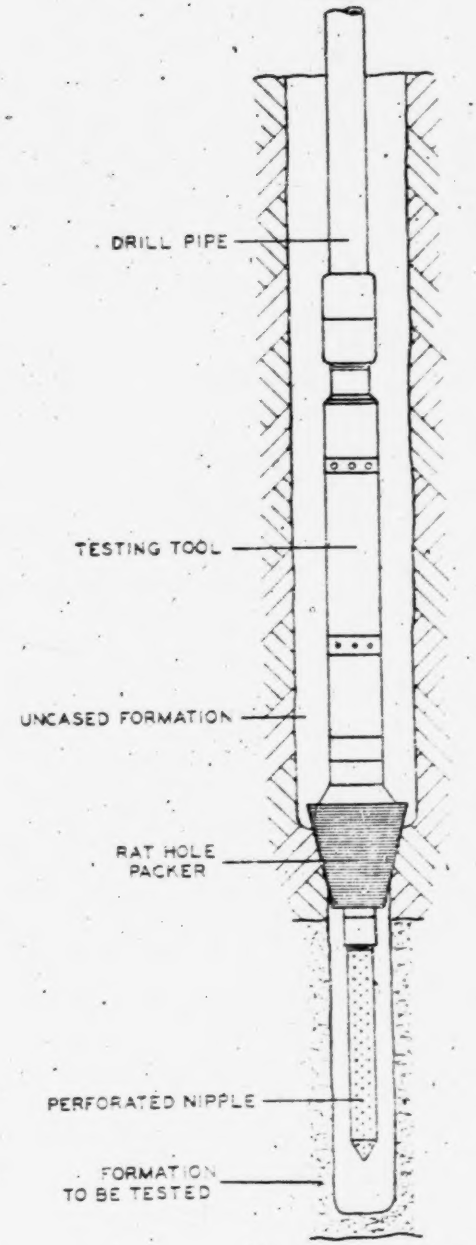
CASING TEST
WATER SHUT-OFF

FIG. 2



FORMATION TEST
WALL PACKER TYPE

FIG. 3



FORMATION TEST
CONE PACKER TYPE

fendants' Exhibit C, showing the use of plaintiffs' Halliburton tester, alleged to be the present commercial embodiment of the patented invention. The defendant Johnston's accused testers, in structure and operation, are different from those in the patent drawing but similar to plaintiffs' devices shown in the illustration. The accused testers and their manner of operation appear in the record. (R. Vol. 2, pp. 226, 227.)

In the illustration, Fig. 1 represents a casing test, or, as it is sometimes called, a "water shut-off" test. It will be noted that the metal casing extends upward from the producing zone, the packer forming a seal against the casing and not the formation. Normally the casing is not set or cemented in a well until something is found that appears of value. However, "a casing is at times set where a hole is not standing up too well, and it is caving some". (R. Vol. 1, p. 268.) The casing protects the wall of the hole. The object of making a "water shut-off" casing test is to demonstrate that no fluid can come down around the outside of the casing, past the cemented portion, and into the uncased portion of the formation below the casing. It is not the purpose of a water shut-off test to determine the productivity of the formation (R. Vol. 1, p. 519) but rather to ascertain whether the casing shoe leaks.

Fig. 2 and Fig. 3 represent a formation test, the former showing the use of a "wall" packer and the latter a so-called "rat hole" packer. Both these packers press against the walls of the formation or

open well hole which distinguishes them from the packer in Fig. 1. The purpose of making a formation test is to obtain samples for determining the course further drilling, if any, should take and whether casing should be set. (R. Vol. 1, p. 552.)

The difference between a casing test, in which the testing device is lowered through a string of casing, supporting the well hole, and a formation test, in which the device is lowered through an open hole, is important for the reason that the Circuit Court of Appeals in the present case seemed to find novelty in the two method claims because the testing apparatus could be safely lowered through the fluid in an uncased well and "that it was not necessary to set the casing permanently and bail out the drilling fluid", as had been done in the prior art, in order to make a test.

One reason for using drilling fluid in rotary drilling is to keep its hydrostatic pressure against the walls of the hole so as to prevent the formation from caving in or being blown in by gas. The specific gravity of such fluid is in excess of water and it will therefore balance the pressure of any water which, for example, might seek to penetrate into the well hole. It also tends to plaster mud against the exposed face of the formation. Circulation of the drilling fluid, while making tests in open formations, was thought by some prior patentees to be beneficial.

If the novelty in the patented method rests upon the elimination of a casing between the packer seat and the top of the well and substituting the sustaining

qualities of heavy rotary mud instead of the metal casing, then so-called casing or water shut-off tests do not employ such novelty, and no infringement exists in respect to those tests. Moreover, if the alleged field of invention is restricted to formation tests alone, and excludes tests where the packer is set within the casing, then lack of patentable invention in the method is at once apparent.

Turning to the patent in suit, we find that it is expressly limited to formation tests where the packer is set against the formation and not against a casing, as is apparent from the title, the written description, and each of the claims, both apparatus and method. Apparatus claim 9, for example, as well as most of the other claims in issue, includes as an element "a packer adapted to be positively pressed against the walls of the formation". Method claims 8 and 18, in the introductory phrase, say that they cover "a method of testing the productivity of a formation". Indeed, on December 16, 1929, nearly four years after the patent application was filed, applicant, in order to overcome a last rejection on Halliday patents Nos. 1,474,630 and 1,510,669 (Defts. Ex. H-14, H-15), amended fourteen claims by inserting the express limitation language, "a packer adapted to be positively pressed against the walls of the formation" in the claims, and they must now be construed in that restricted manner, if valid at all. (File wrapper, R. Vol. 2, pp. 104-106.) Each of the ten apparatus claims here in suit includes the limitation that the packer (sealing means) is adapted to be "positively pressed against the walls of the formation" to seal the same. The

Halliday patents showed a packer pressing against the inner walls of an oil well casing (No. 1,474,630, Figs. 1 and 2; No. 1,510,669, Fig. 1) and the Simmons claims were especially narrowed and restricted to avoid those references.

Whether the Patent Office was right or wrong in rejecting the claims, is immaterial. If dissatisfied with the rejection, the applicant should have pursued his remedy by appeal; and where, in order to get his patent, he accepts one with narrower claims, he is bound by it. *Shepard v. Carrigan,* 116 U.S. 593, 597; *Hubbell v. United States,* 179 U.S. 77, 83.

In considering a similar situation, this Court said:

> "The applicant having limited his claim by amendment and accepted a patent, brings himself within the rules that if the claim to a combination be restricted to specified elements, all must be regarded as material, and that limitations imposed by the inventor, especially such as were introduced into an application after it had been persistently rejected, must be strictly construed against the inventor and looked upon as disclaimers. (Citing cases.) * * * The patentee is thereafter estopped to claim the benefit of his rejected claim or such a construction of his amended claim as would be equivalent thereto. (Citing cases.)" *Smith v. Magic City Kennel Club,* 282 U.S. 784, 790, 51 S. Ct. 291.

Simmons was required by the Patent Office to abandon casing packers, necessary to make so-called casing or water shut-off tests, and hence the Simmons

patent claims cannot now be extended to cover the use of such packers. Indeed, Simmons makes no reference whatever in his patent to any type of test other than a formation test, and there is not the remotest suggestion that a "wall" packer instead of a "rat hole" packer may be used.

It will be seen from our discussion of the method claims that seating a packer against the casing wall, as distinguished from the formation wall, is precisely contrary to the theory on which the Ninth Circuit Court of Appeals apparently found invention in the method.

ASSIGNMENTS OF ERROR DISCUSSED.

We shall now take up in detail the errors in the opinion of the Circuit Court of Appeals for the Ninth Circuit, respecting the two method claims.

1. **The method claims merely describe the function of an apparatus designed and intended for a particular use.**

The function or effect of an apparatus is not patentable as a process. That rule of patent law, affirmed and reaffirmed by this Court, is not now open to serious doubt. This Court said:

> "It is undoubtedly true, and all the cases agree, that the mere function or effect of the operation of a machine cannot be the subject matter of a lawful patent." *Expanded Metal Co. v. Bradford*, 214 U.S. 366, 29 S. Ct. 652.

Other cases are:

Corning v. Burden, 56 U.S. 252, 268;

Risdon Iron & Locomotive Works v. Medart, 158 U.S. 68, 77, 15 S. Ct. 745;

Westinghouse v. Boyden Power Brake Co., 170 U.S. 537, 557, 18 S. Ct. 707.

In order to provide a convenient basis for the study of the method claims, they have been reduced to their component parts and are here presented in parallel arrangement with two mechanical claims, so that the identical subject matter may easily be recognized in method and apparatus claims.

For the purpose of further comparison, the mechanical limitations in the method claims are set forth in italics, corresponding with similar mechanical elements in the apparatus claims.

8. (Valid method claim.)	13. (Invalid apparatus claim.)
A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes	Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, which includes
lowering *an empty string of pipe* into the well through the drilling fluid to adjacent the formation,	*an empty string of pipe* to be lowered into the well to adjacent the formation to be tested,
the pipe carrying *a packer*	*a packer* carried by *the pipe*
and having *a valved inlet* at its lower end which is closed while *the pipe* is being lowered,	
setting *the packer* above the formation to seal off the drilling fluid from the formation,	[*the packer*] adapted to be positively pressed against the walls of the formation to seal off the same,

opening the *valved inlet* after *the packer*, is set to permit cognate fluid from the formation to enter *the pipe*,	means at the lower end of *the pipe* to receive a sample from the formation including *an inlet opening* into *the pipe* and *a valve structure*. for controlling the inlet,
closing the *valved inlet* against the entrance of fluid from the well by movement of *the pipe*, raising *the pipe* so closed to remove an entrapped sample and *the packer* from the well.	*the valve structure* including a plurality of relatively movable parts one of which is secured to *the pipe* and another of which is connected to *the packer*.

A comparative analysis of claims 18 and 19 presents a more striking parallel:

18. (Valid method claim.)	19. (Invalid apparatus claim.)
A method of testing the productivity of a formation encountered in a well containing drilling fluid involving	An apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising
the insertion of *only a single string of pipe* into the well to make a test,	*a string of pipe*
which includes lowering *a test string* into the well through the drilling fluid	[*a string of pipe*] to be lowered into the well through the drilling fluid to adjacent the formation * * * and to be raised out of the well to remove the entrapped sample, * * *
with *a packer* carried by *the string*	*a packer* carried by *the pipe* as the pipe is lowered into the well * * *
and a *valve inlet* at the lower end of the *string* closed against the entrance of fluid from the well:	*an inlet* to *the pipe* communicating with the well below the point at which *the packer* seals off the well.

setting *the packer* above the formation * * *	[*the packer is*] adapted to be seated by manipulation of *the pipe* to seal off the well above the formation, *said packer* adapted to be positively pressed against the walls of the formation to seal off the same,
closing *the valve* to prevent the subsequent entrance of fluid from the well through *the inlet* and releasing *the packer,* and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample.	and means for controlling *the inlet* to permit fluid from the formation to enter *the pipe* while *the packer* is set and to prevent fluid from entering *the pipe* after *the packer* is released, and *the pipe* is being raised out of the well [to remove the entrapped sample].

The two method claims held valid in the present case merely describe the function or effect of the operation of a device, which device is itself old, and open to the public to use. They fall within the condemnation of the doctrine that a patentee may not broaden his apparatus claims by describing them in terms of function, so as to monopolize the use of any form of testing tool.

Remembering that the Simmons apparatus (also Franklin) consists of the combination of pipe, packer, and valve, adapted to be lowered in a well hole, we find the function, or manner of using such apparatus, completely described in method claim 8, the steps of the so-called method, being as follows:

A method of testing the productivity of a formation consisting of:

(1) "*lowering* an empty string of pipe"

(2) "*setting* the packer"

(3) "*opening* the valved inlet"

(4) "*closing* the valved inlet"

(5) "*raising* the pipe, so closed, to remove an entrapped sample and the packer from the well".

Lowering of the pipe, setting the packer, opening the valve, closing the valve and raising the pipe, is the manner in which the Simmons device (pipe, packer and valve) was intended to operate and be used.

A person using the Simmons device of the invalid apparatus claims, for the very purpose for which it was designed and intended to be used, would of necessity, practice the so-called method of claims 8 and 18.

The unparalleled situation results that the public can make and sell the Simmons device, because the apparatus claims are anticipated, and therefore invalid, but the public cannot actually use the device, for the very purpose and in the precise manner for which it was constructed and intended to be used, because such use would be an infringement of so-called valid method claims.

A patentee should not be given a monopoly on the use of an old device. To do so would be repugnant to the theory upon which our patent system is grounded, namely, to encourage invention so the public may ultimately be benefited, rather than to throttle industry by creating an obnoxious monopoly.

It is impossible for us to perceive how the so-called process can be considered in any other light than as the mere function of the apparatus. The only way shown or described in the patent, for practicing the so-called

method, is to use the particular device covered by the apparatus claims.

The Court below, dismissed our argument regarding the invalidity of the method claims by saying:

"The process in suit is not the function of a machine: it requires manual operation."

The work done with hands, was lowering and raising the device on the end of the drill pipe, like any other well drilling tool, so as to put it in a position where it would function. Opening and closing the valve was the manner in which the apparatus was intended to operate.

But the same kind of manual operation was required with the old Franklin device when it was lowered into a well hole and the pipe rotated to open or close its valve. In describing the Franklin patent, the Court correctly said that:

> "The device disclosed by this patent is a valve connected with a well tubing, or pipe, constructed to be placed in a well and *operated manually* to regulate the flow of the well."

If Franklin disclosed a "manual operation", as specifically found, how can the same "manual operation" in Simmons constitute invention? Indeed, every apparatus or machine requires some manual operation in order to accomplish its intended purpose. It cannot be the law that any and every device requiring manual operation may be the subject of a process patent.

The effect of manually operating of the Simmons device in the intended manner is to make an oil well

test. The method is, in reality, nothing more than the use of apparatus, which is itself incapable of valid patent claims.

2. The method claims lack invention over Franklin Patent No. 263,330, in view of the prior art.

Although the Court held that the Franklin device anticipated the apparatus claims of the plaintiffs' patent, "and could be used in carrying out the patented process", still that, according to the opinion, did not negative invention as to the method claims, for the reason that "the apparatus used in carrying out a process may be old and yet the process valid". *Expanded Metal Co. v. Bradford*, 214 U.S. 366, 29 S. Ct. 652, and *Carnegie Steel Co. v. Cambria Iron Co.*, 185 U.S. 403, 22 S. Ct. 698, are cited as authorities.

The rule of this Court that an apparatus used in carrying out a process or method may be old, and yet the process valid, is subject to the exception that if the process is the mere function of an apparatus, another apparatus capable of performing the same function would be an anticipation.

The *Expanded Metal* case, supra, related to a method of making open metal work, by performing certain mechanical operations on sheet metal. In sustaining the validity of the method claims, this Court found that the mechanical operations must not be merely the obvious, inherent or necessary mode of operation of the machine.

In the *Carnegie Steel* case, supra, one of the most frequently cited and best considered patent opinions of this Court, a process for mixing pig iron was in-

volved. While the Court held that such mixing process was not anticipated by earlier mechanism disclosed in a prior patent, still this Court clearly recognized the rule that the function or operative effect of a machine is not patentable. An earlier machine patent could anticipate a subsequent process, if such process was the function or operative effect of the machine. The Court use the following language, appearing at page 425:

> "True, if the process were the mere function of a machine, another machine capable of performing the same function might be an anticipation; but this is not because a process can be anticipated by a mechanism, but because, as we have held in several cases, the mere function of a machine is not patentable as a process at all." Citing *Corning v. Burden*, 15 How. 252; *Risdon Locomotive Works v. Medart*, supra, 158 U.S. 68, 15 S. Ct. 745.

That is precisely the situation here. Since the Appellate Court below found that the early Franklin device "could be used in carrying out the patented process", in the language of the last quoted decision, it would be "another machine capable of performing the same function", and therefore an anticipation of such process.

The necessary and intended method of using the old Franklin tool is precisely the same as the process steps of Simmons' claims 8 and 18, except that the introductory clauses of these claims specify a method of "testing", whereas Franklin makes no mention of such use. The result of the Simmons method, "removing an entrapped sample", is the identical result attained by

Franklin, when his device was raised from the well hole, as he intended to raise it, with the valve closed. The Franklin patent, alone, is a complete anticipation.

3. The method claims describe, at most, only a different use for the old device disclosed in the Franklin patent, which different use is itself old.

The new use of an old apparatus is not invention. That pronouncement has been made, many times, by this Court, as, for example:

> "It is settled by many decisions of this Court, which it is unnecessary to quote from or refer to in detail, that the application of an old process or machine to a similar or analogous subject, with no change in the manner of application, and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not before been contemplated." (Citing cases.) *Pennsylvania R. R. v. Locomotive Truck Co.,* 110 U.S. 490, 494.

> "It is no new invention to use an old machine for a new purpose. The inventor of a machine is entitled to the benefit of all the uses to which it can be put, no matter whether he had conceived the idea of the use or not." *Roberts v. Ryer,* 91 U.S. 150, 157.

Other cases are:

Brown v. Piper, 91 U.S. 37;

Blake v. San Francisco, 113 U.S. 679, 5 S. Ct. 692;

Ansonia Brass and Copper Co. v. Electrical Supply Co., 144 U.S. 11, 17, 12 S. Ct. 601;

Lovell Mfg. Co. v. Cary, 147 U.S. 623, 637, 13 S. Ct. 472;

Knapp v. Morss, 150 U.S. 221, 228, 14 S. Ct. 81;
Powers-Kennedy Contracting Corp. v. Concrete Mixing and Conveying Co., 282 U.S. 175, 51 S. Ct. 95;
Paramount Publix v. American Tri-Ergon Corp., 294 U.S. 464, 55 S. Ct. 449.

Where it required no change in the old device to adapt it to a new use, such adaptation cannot be the subject matter of valid method claims; otherwise, if the device were separately patented, the right of the prior patentee is invaded by excluding him from the use of an apparatus which, by the above rule and authorities, he is exclusively entitled to enjoy.

When the Franklin patent expired in the year 1899, the public was entitled to use that device for any purpose to which it could be put. To enjoin its use for well testing purposes, under the guise of valid method claims to Simmons, would, in effect, be extending the term of the Franklin patent approximately 68 years, in favor of a mere appropriator, instead of the 17 years allowed by statute.

Simmons made no changes in structure over Franklin, necessary to adapt the device to testing by entrapping a sample instead of otherwise regulating the well flow. According to long established principles he is not entitled to a patent merely for suggesting the application of the old Franklin device to a new or different use.

The double use of the old Franklin device is not patentable merely because Simmons intended to lower it through rotary drilling fluid, instead of the well

fluid present in the days of Franklin. That is only a difference in the specific gravity of the fluid and a change of environment, if change at all, in which the device was to operate. It necessitated no variation in either the structure or manner of operation from that disclosed by Franklin.

Finally, the use of a device for testing the productivity of a well hole is, in itself, very old in the art. The Lyon patent, No. 46,124, of 1865, and Burr & Wakelee patent, No. 68,350, of 1867, show devices for testing well strata fluids; and Cox patent, No. 1,347,534, and Edwards patent, No. 1,514,585, issued before Simmons filed his application, show testers for entrapping a sample from deep rotary drilled wells.

4. The method claims depend for their novelty upon mechanical limitations, expressly placed there to avoid the prior art.

The file wrapper of the Simmons patent shows that as originally filed the application did not include method claims. They were added in an amendment, dated March 9, 1926 (R. Vol. 2, pp. 29-48), when four were inserted, of which the following is an example:

> "9. A method of testing the productivity of a formation in a well, which comprises lowering to the formation an empty conduit, sealing off from the formation the hydraulic pressure of the fluid within the well, permitting the cognate liquids of the formation to discharge into said conduit, closing the conduit against the entrance of outside fluid, and removing the conduit with such liquids to the top of the well." (R. Vol. 2, p. 42.)

All four claims were at first correctly rejected by the Patent Office "as being improper method claims, in

that they merely set forth the functions of applicant's device". (R. Vol. 2, p. 50.) The method claims were rewritten (R. Vol. 2, pp. 54-55), but again rejected by the Patent Office on Edwards patent No. 1,514,585 and Cox patent No. 1,347,534. (R. Vol. 2, p. 66.) They were then cancelled and three new method claims substituted (R. Vol. 2, pp. 68-69), one being claim 8 now in suit. Applicant argued that the reworded claims were structurally different from Edwards and Cox. By a subsequent amendment two of the three method claims were cancelled and what is now claim 18 of the patent was substituted (R. Vol. 2, p. 97) and the Patent Office was persuaded to allow the two method claims in suit.

In other words, the file wrapper demonstrates that the two method claims survived the prior art only because they differed *structurally* from the Cox and Edwards disclosures, particularly in that the rewritten claims embodied a single empty string of pipe rather than the double string of the two patentees. Applicant argued that such mechanical limitations, deliberately placed in the claims, made them patentable over the state of the art.

A mechanical limitation in method claims renders such claims invalid, if the only novelty is the mechanical limitation. To be patentable, a method must be independent of the function or utility of any particular piece of apparatus. *Tilghman v. Proctor,* 102 U.S. 707, 722. Improving or changing the apparatus used to accomplish a result, is not inventing a method. *Dreyfus v. Searle,* 124 U.S. 60, 8 S. Ct. 417. A structural limitation, necessary for performing the process.

is out of place in the Simmons method claims, for it makes those claims equivalent in substance to the apparatus claims of the same patent. The Patent Office has consistently held that patentable novelty in method claims cannot be based on positive recitations of structural limitations included therein. *In re Fessenden,* 1916 C.D. 172, 45 App. D. C. 21, 26; *Ex parte Foreman,* 1924 C.D. 47, 48.

In our parallel arrangement of claims, commencing on page 38 herein, we have italicized all the mechanical elements of the two method claims corresponding with equivalent elements in the apparatus claims.

Taking then, from the method claims here involved, the matter which describes the machine used, that is, the mechanical or structural limitations, we find that the process is the same old process used by Cox and Edwards of lowering a pipe or test tube through the drilling or other fluid of the well, sealing off the formation to be tested from other areas, opening the pipe to permit the fluids from the formation to enter, closing the pipe and withdrawing the entrapped sample.

The novelty of a process must reside in the thing done to the material operated upon and not in the mechanical means used to perform such process. That was recently emphasized by this Court in *Smith v. Hall,* 301 U.S. 216, 57 S. Ct. 711, involving a method of staged incubation of eggs. The same patent had been before the Court in *Smith v. Snow,* 294 U.S. 1, 55 S. Ct. 279, and *Waxham v. Smith,* 294 U.S. 20, 55 S. Ct. 277. A prior use by Hastings, was before the

Court in *Smith v. Hall*, supra, which had not been considered in the two earlier cases. This prior use was sought to be differentiated from the process patent in suit upon the ground that a large number of compartments had been used and the eggs placed first in one compartment and then in another, and that doors controlled the temperatures in the different compartments. These mechanical elements were not present in the device used to illustrate the method of the patent. The Court, however, pointed out that the tendency of the operation was to carry heat units from the more advanced to the less advanced eggs which was, in part, the novelty of the incubation method patented. In holding that the novelty of the method resided in the steps taken, and not the mechanical means used, this Court said in *Smith v. Hall*, supra:

> "The patent was sustained in the Snow and Waxham Cases, supra, only by establishing that neither the arrangement of the eggs, nor the particular order in which the propelled current should reach the eggs, nor the manner in which it was guided or controlled, is part of the patent claimed * * * It was the method thus defined which Hastings used, regardless of the particular structure which he devised to guide and control the current of air in his incubator, or the order in which it came into contact with the heater and eggs of different stages. It is immaterial that his structure for using the method was neither the best possible nor as skilfully designed or used as that later employed by Smith." (Citing cases.)

See also:

Marchand v. Emken, 132 U.S. 195, 10 S. Ct. 65.

Thus in the instant case, it is immaterial so far as any method is concerned, whether the Cox patent, No. 1,347,534, disclosed the method practiced under the most favorable conditions, had the best type of valve for entrapping a sample, or utilized a second string of pipe for circulating drilling fluid. Even though the Cox apparatus was less efficient than that of Simmons, the method nevertheless remained the same.

Cox tested a well drilled under the rotary system by lowering an empty test tube through drilling fluid to the formation to be tested, and isolating that area, by means of a packer, from the fluid above. He opened his test tube and the fluid from the formation, if any, entered it. Then by using his flap valve, the sample was retained in the test tube, and raised to the surface of the ground. If that was a patentable method of testing wells, then it is utterly immaterial what kind of apparatus or machinery was used. The Cox device may not have been the best, and the earlier Franklin valve, rather than the Cox flap valve and brittle disk, might have been more efficient. But that has nothing to do with the method itself.

In conjuncton with the Cox method for testing a well, he supported the well walls by circulating mud-laden fluid. To that end he provided a second string of pipe, surrounding the test tube, through which the fluid might be pumped and circulated, but such circulation had nothing to do with making the test. It was a safety measure in common use to protect the well bore. Invention in the patented method is sought to be sustained upon the theory that supporting the well bore was not utilized by Simmons. But it must be

apparent that merely by not combining the testing of a well with sustaining its walls, no novelty can be imparted to the testing method. Laying aside all special apparatus, the Simmons method is identical with that previously disclosed by Cox.

We have considered the method of the Cox patent at some length, but substantially the same argument applies to Edwards patent No. 1,514,585. Whatever patentable novelty there could have been in Simmons, consisted wholly in the apparatus used, as an improvement over that shown in Cox and Edwards, but even such improvement had previously been disclosed by Franklin.

The two method claims are invalid for the reason that they include mechanical limitations, expressly inserted therein to avoid the prior art which disclosed the same method that Simmons sought to patent. Without such limitations the alleged method lacked invention over the Cox and Edwards patents.

5. **The method claims are not the subject matter of patent protection at all.**

The two method claims are invalid because they do not relate to a tangible product or subject matter which is changed in some useful manner, and for that reason are not capable of patent protection, as a method, at all.

A method, as such, is not made the subject of a patent.* It is included under the general term "use-

*R. S. §4886 (35 U.S.C.A. 31) reads in part, as follows:

"Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof * * * may * * * obtain a patent therefor."

ful art". *Corning v. Burden,* 15 How. 252, 267; *The Telephone Cases,* 126 U.S. 1, 533, 8 S. Ct. 778.

A machine or apparatus is a thing, visible to the eye; a process is a conception of the mind, seen only by its effects, when being performed. To be patentable, this Court pointed out, a process must be independent of any machine:

> "As, for instance, A has discovered that by exposing india-rubber to a certain degree of heat, in mixture or connection with certain metallic salts, he can produce a valuable product or manufacture: he is entitled to a patent for his discovery, as a process or improvement in the art irrespective of any machine or mechanical device. B, on the contrary, may invent a new furnace, or stove, or steam apparatus, by which this process may be carried on with much saving of labor and expense of fuel, and he will be entitled to a patent for his machine as an improvement in the art". *Tilghman v. Proctor,* 102 U.S. 707, 723, quoting from *Corning v. Burden,* supra.

The rule for determining a process has been many times stated by this Court.

> "A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing." *Cochrane v. Deener,* 94 U.S. 780, 788.

Also:

New Process Fermentation Co. v. Maus, 122 U.S. 413, 418, 7 S. Ct. 1304;

Risdon Iron and Locomotive Works v. Medart, 158 U.S. 68, 15 S. Ct. 745;

Holland Furniture Co. v. Perkins Glue Co., 277 U.S. 245, 255, 48 S. Ct. 474.

Not every method is patentable as a process. Under the established definition (*Cochrane v. Deener*, supra, and other cases cited) there must be a tangible product or a change in character or quality brought about. ...

A series of steps, which does not change the physical character or condition of the object operated upon, does not constitute a patentable method. Thus, for example, a method of moving an object from one place or another, or causing it to emit a sound, or to reflect a ray of light, yet leaving it in the same form, color, composition and physical condition that it possessed before, would not be patentable as a process. In the language of the patent law, it is not an "art".

From this it follows that the function or operative effect of an apparatus is not a process at all, and therefore not patentable. The operation of an oil well testing device, which merely entraps and brings to the top of the well a sample of the fluid at the bottom of the well, and changes nothing except the location of that sample, is really not a patentable process at all. The method claims are invalid for that reason alone.

6. **The claims are not infringed, even though valid, because defendants employ a structure and mode of operation different from that disclosed in the patent in suit.**

Since both the apparatus and method claims are now before this Court, we will consider them together

under this heading. The rule for determining infringement of method claims is the same as for apparatus claims; especially when, as here, the asserted novelty is due to the mechanical limitation appearing therein.

In view of the prior art heretofore discussed, it must be obvious that, as specifically held by the Fifth Circuit Court, Simmons was not a pioneer inventor nor indeed, any other kind of an inventor. A pioneer inventor is entitled to broad patent protection; but the record here affords no ground whatever for the contention that Simmons occupies any such position. The various patents introduced in evidence as a part of the prior art, show beyond doubt that if the Simmons patent is valid at all, it is merely an improvement, for which reason the claims should receive a narrow construction, and the patent limited to the precise device therein described. It cannot, by a sweeping interpretation of the language of the claims, be extended to cover all forms of testing tools, no matter how constructed or operated. Simmons did not invent the Johnston tool, which is covered by its own patents. (R. Vol. 2, pp. 448-479.)

Defendants' device shows a substantially different mode of operation (R. Vol. 1, pp. 220-276) from that disclosed in the Simmons patent. In *Cimiotti Unhairing Co. v. American Fur Ref. Co.*, 198 U.S. 399, 414, 25 S. Ct. 697, it is said that if defendant's device shows a substantially different mode of *operation*, even though the *result* is the same, the charge of infringement is avoided.

The Fifth Circuit Court held that the Simmons structural claims "must be limited to the form of apparatus disclosed" and so concluded that:

> "Johnston does not use a stop cock valve, nor actuate it by turning the string of pipe, but his means of trapping and withdrawing the sample are substantially different from those disclosed by Simmons. The Johnston apparatus does not infringe." (p. 273.)

The device used by defendants and covered by the five Johnston patents is shown in the drawings appearing in the book of exhibits. (R. Vol. 2, pp. 225-227; Ex. 16-B, 16-C and 16-D.) It is described in the testimony of O'Neill. (R. Vol. 1, pp. 220-276.) A full size device was examined in open court by the District Judge, who found as a conclusion of law that there was no infringement, even if the claims were valid. (R. Vol. 1, p. 42.) Accordingly, a decree to that effect was entered. (R. Vol. 1, p. 43.)

One type of defendants' accused device is used for making "water shut off" or casing tests. (Plffs. Ex. 16-D.) The packer presses against the inside of the casing. The use of such a device for that purpose, obviously not an infringement under any theory of this case, is actually enjoined under the present decree of the Ninth Circuit Court of Appeals.

A somewhat different type of accused device is used by defendants in making formation tests. (Plffs. Ex. 16-B; R. Vol. 2, p. 225.) In the drawing, Fig. 1 is the tester, including four valves, attached to the drill pipe, and Figs. 2, 3 and 4 show different forms of

packers. Fig. 5 shows the trip valve, which is the inlet to defendants' testing chamber.

The operation of the Johnston tester, equipped with a rat hole packer, is shown in the drawing (Plffs. Ex. 16-C; R. Vol. 2, p. 226), in which Fig. 1 represents the device going into the well, with both the main valve and trip valve closed; Fig. 2 discloses the packer set with the main valve and trip valve open; and Fig. 3 shows the device coming out of the well, with the main valve closed and the sample trapped in the pipe.

The Johnston complete device has four valves, as distinguished from the single rotating valve in the Simmons patent. The four valves are the: (1) main valve; (2) trip valve; (3) equalizing valve; and (4) emergency or circulating valve.

The Simmons device shows only a rat hole packer and the claims are limited to a formation tester, whereas the Johnston device may be used either for formation or casing tests. The Simmons valve opens and closes by rotating the drill pipe to the right or left. In the Johnston device, simultaneously with setting the packer, the weight of the drill pipe compresses the large spring and opens the main valve while the equalizing valve is being closed. The opening of the main valve does not, however, permit the fluid to enter the drill stem, which is still closed by the trip valve. The trip valve is the real entry into the Johnston sampling chamber and is opened by dropping a "go-devil" into the drill pipe at the top of the well, the trip valve opening only when the

"go-devil", after passing rapidly downward through the drill pipe, forcibly strikes the trip valve positioned within the drill pipe and above the main valve.

When the operator wants to close the Johnston device, he lifts the drill pipe upwardly and in doing so removes the weight off the packer, which in turn causes the giant spring to close the main valve, thus retaining the fluid sample within the drill pipe and above the main valve. The pipe is then withdrawn and the sample examined.

Of course, the sample can also be obtained at the top of the well hole without the necessity of closing the main valve, when the pressure is sufficient to cause a flowing well.

If the well hole is crooked, as most of them are, the packer will often stick, the drill stem twist and, in the case of the Simmons device, the valve will open while the device is descending and so ruin the test. Using the Johnston device under the same circumstances, the closed and locked trip valve would prevent foreign matter from coming into the drill pipe even though the main valve opened while the device was being lowered into the well hole.

The Simmons tester has no means for circulating drilling fluid while going into or coming out of the well. On the other hand, the Johnston device provides for such circulation by reason of the circulating valve. A careful driller will not use a device through which he cannot pump rotary mud in case of an emergency, even though in doing so the sample be lost, as it would with the Johnston tester.

Rotating the Simmons device to the right or left, in order to open or close the valve, would have a further tendency to unscrew the drill pipe at any coupling, a condition which could not occur in using the Johnston tool which is only slightly raised and lowered (not rotated) in order to open or close the main valve. The "go-devil" is dropped through the drill pipe to open the trip valve or final entrance into the Johnston testing chamber (drill pipe) and no movement of the pipe is required for that purpose.

Those are only some of the many differences between the structure and mode of operation of the two devices. Since plaintiffs' patent does not disclose a primary invention, if it be an invention at all, but at most only a slight improvement, and defendants' construction and manner of operation may be readily differentiated from the patent in suit, it must follow that under the authority of *Cimiotti Unhairing Co. v. American Fur Ref. Co.*, supra, and other cases, the charge of infringement cannot be sustained.

The above conclusion is inescapable when we remember that the patented article never went into commercial use. (R. Vol. 1, pp. 592-596.) Plaintiffs, realizing the weakness of their position, attempted to prove, at the trial, the success of the later developed Halliburton "Stop Cock and Gear" (R. Vol. 2, pp. 312-313) and "J-Slot" (p. 315) testers.

The "Stop Cock and Gear" device consisted of a stop-cock valve, a gear, ball bearings, and a tube that extended upwardly from the valve inside the drill stem, for which an application for patent was

filed by Halliburton. More recently, the Halliburton "J-Slot" tool with a compression spring has been used. (R. Vol. 2, pp. 224, 315.) It closely resembles the Johnston tester and is a wide departure from the original Simmons tool. The device requires a quarter turn and simultaneous lowering to open; a quarter turn back and upward movement then permits a spring actuated valve or valves to close the device.

Halliburton's own appraisal of the Simmons device, embodied in statements to the Patent Office, and his action in junking it and applying for a patent on his own stop-cock and gear device, and his more recent "J-Slot" tool, having an entirely different mode of operation from the former Simmons tool, completely disprove any contention that the Simmons device has had a widespread commercial success. On the contrary, it was a complete failure. The commercial use of the later "Stop Cock and Gear" device and the recent "J-Slot" tool, establishes the inoperativeness and failure of the original Simmons design.

None of the claims in suit, either apparatus or method, is readable on the structure and operation of the Johnston tool. But even if, as a matter of language, the Simmons claims are readable on defendants' structure or method, it would not follow that plaintiffs' patent was infringed, because the Johnston tool and its mode of operation are so different from anything shown or described in the patent.

The Simmons claims must be read in the light of the specifications and drawings of the patent, and if

defendants' device reaches the same result by different means or mode of operation, the charge of infringement is not sustained.

The leading case on this subject is *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 568, 18 S. Ct. 707, holding that where there was a substantial difference in the mode of operation for valves for air brakes, the charge of infringement was not sustained even though the Westinghouse patent was a pioneer patent, and even though the claims in that patent read upon the valves employed by the defendant. The reasoning applies with equal force to both apparatus and method claims. Said the Court:

> "The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who had violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent."

See, also:

> *Holland Furniture Co. v. Perkins Glue Co.*, 277 U.S. 245, 257, 48 S. Ct. 474.

Plaintiffs did not prove the use of the Johnston tool by the Honolulu Oil Corporation, the other defendant herein, nor that the method, alleged to infringe, was ever used in testing a well owned by that company. The Honolulu Oil Corporation, itself, neither made, used nor sold the device. It employed

the defendant Johnston Company only to make the test, and in doing so the Johnston Company operated the accused device. The use was solely that of the Johnston Company as an independent contractor, to secure the results it was employed to obtain. It realized the profits from the use, and the Honolulu Oil Corporation paid for the service rendered. "Where a contractor is employed to do certain work and in doing it infringes a patent, the contractor, not the employer, is liable." (48 *C. J., Patents,* Sec. 544, p. 340.) See, also, *Keplinger v. de Young,* 23 U.S. 357.

Whatever view this Court takes of the patent in suit, there is no evidence whatsoever that the Honolulu Oil Corporation has infringed.

VI.

THE COURT'S OPINION.

In regard to the validity of the two method claims, the Circuit Court of Appeals for the Ninth Circuit, to paraphrase the opinion, said:

> "Although we hold that the Franklin device anticipates the combination claims of appellant's patent *and could be used in carrying out the patented process,* this holding does not negative invention as to the process claims in suit." (p. 439.)

The Court found that in the prior art, oil well tests were made under two conditions: (1) permanently setting casing and bailing out the drilling fluid; or

(2) omitting the casing, but maintaining the circulation of drilling fluid so as to keep the well walls from crumbling in.

After reviewing the purposes stated in the Franklin patent, the Court intimated that there was something involving patentable novelty in the use of the Franklin tool for testing a well, instead of regulating its flow:

> "The purposes of the Franklin patent were two-fold: First, to provide a method of keeping the tubing *closed* while it was being lowered into the well or *removed therefrom*, and, second, to provide means of temporarily closing the tubing to allow the gas in the well to obtain sufficient head so that the well would flow. There is no *use* disclosed of taking an entrapped sample from an unfinished well containing drilling fluid. The device was evidently intended to be permanently attached to the tubing of the well. There is no suggestion of the last step of the patented process in suit, that is, the taking of an entrapped sample from an incomplete well containing drilling fluid." (p. 439.)

The Court correctly states the purposes expressed in the Franklin patent, the first being to close the tubing while the device is lowered into the well "or removed therefrom"; but erroneously implies that in order to anticipate, it was necessary for Franklin to suggest that his device could be used for "taking an entrapped sample". *Stow v. Chicago*, 104 U.S. 547, 550.

If the device is operated in the manner intended by Franklin, the result is inevitable that any fluid entering the tubing would be entrapped therein when the valve is closed, and such fluid would be available to the operator for testing purposes after the device is withdrawn.

Franklin may not have been interested in recovering what Simmons has called "an entrapped sample", but the thing he did recover was precisely the same.

We respectfully disagree with the Court below that Franklin intended the device to be "permanently attached" to the well tubing, for he describes not only the insertion; but also the withdrawal, of the tubing. If it was to be attached only once, and thus permanently, its withdrawal would be of no moment.

We likewise disagree with the Court that there is no suggestion of the last step of the alleged patented process, that is, "the taking of an entrapped sample from an incomplete well containing drilling fluid". What Franklin did recover was a portion of the oil from the formation—call it an entrapped sample or whatever one may please. The well in which the Franklin device was to be used, being a well of the time of his patent, was incomplete in the sense of the term as now used, in that it was not cased to the bottom, if cased at all, and there was the same, if not greater, possibility of a cave-in than exists in the unfinished well of today. True, it did not contain rotary drilling fluid, as we now know it, but it contained other fluids, which were less adaptable to the

maintenance of the walls of the well than is the drilling fluid of today.

Since Franklin was entitled to every use to which his tool could be put, whether he knew it or not, on the expiration of his patent the public falls heir to that right.

Other inventors, prior to Simmons, had found that permanently setting a casing and bailing out were unnecessary and that a test could be made by allowing rotary drilling fluid to remain in an uncased well. The Cox patent No. 1,347,534 and Edwards patent No. 1,514,585 are examples of devices for "taking an entrapped sample from an unfinished well containing drilling fluid".

In another portion of the opinion the Court found that if the pressure of the drilling fluid against the open well walls was removed, cave-ins against the drill pipe might prevent the removal of the testing tools. The Court then concluded:

> "The patentee discovered that a well could be safely tested by the lowering of a *single string* of pipe equipped with a valve packer and strainer and that it was not necessary to set the casing permanently and bail out the drilling fluid, or, if a test were attempted without permanently setting the casing that it was not necessary to provide an extra string of pipe for *circulation* of the drilling fluid." (Citing *Lawther v. Hamilton*, 124 U.S. 1, 8 S. Ct. 342, and other cases.)

Even plaintiff, Halliburton accords Simmons no such discovery, as Halliburton's own experience in

cementing wells had taught him the same thing the Court says Simmons discovered. (R. Vol. 1, p. 70.)

We submit that if Simmons merely discovered "that a well could be safely tested by the lowering of a *single string* of pipe equipped with a valve packer and strainer" (the old Franklin combination) into an unfinished well (as Franklin did) for the purposes of testing, then the conclusion is inescapable that he merely found a new use, at most, for the old Franklin tool. That really is the basis upon which the Court rests its decision.

But the Court also says that Simmons found that it was not necessary to provide an extra string of pipe for *circulation* of drilling fluid in an unfinished well for the purposes of testing. Franklin had used a single string and found it unnecessary to circulate fluid in an unfinished well. Here again, we submit, if the Simmons discovery was that in an unfinished well "it was not necessary to provide an extra string of pipe for *circulation*" (as with Franklin) in order to make a test, then the conclusion is equally certain, that here again Simmons only found a new use for an old device.

Lowering a "single string" of pipe, or dispensing with "circulation", is really saying the same thing in different ways. Franklin did both in an uncased and unfinished well, as it was known in his day. If Cox and Edwards preferred to lower a two-string device through such drilling fluid to make a test, what is to prevent the public from lowering the old Franklin

one-string device through such drilling fluid, in order to make a similar test? Even in the old days, the Franklin tool was inserted in whatever fluid the well contained.

Simmons did not discover that an uncased well wall might crumble, unless supported by rotary mud, and prevent oil well tools from being withdrawn: nor did he discover that a casing would prevent such cave-ins. Those discoveries, really phenomena of nature, unpatentable in themselves (*Tilghman v. Proctor*, 102 U.S. 707, 726), were made long before the time of Simmons and are wholly unrelated to any testing process.

If the alleged discovery of Simmons is the omission of both a casing and circulation, then such omission really possesses no merit and has no use. Both plaintiffs and defendants must utilize the casing, when water shut-off tests are made: and while employing single string testers, they do not omit altogether the circulation of drilling fluid. By use of extra valves, they can and do reestablish circulation whenever necessary, conclusively showing that any thought Simmons may have had of dispensing entirely with circulation was impractical and was never commercially used either by himself or his successors in interest.

Lawther v. Hamilton, 124 U.S. 1, 8 S. Ct. 342, relied on by the appellate court in reaching its conclusion, is not applicable. In that case the patentee eliminated a step of a prior process and secured the same or more

advantageous results thereby. Simmons, by eliminating circulation and the ability to circulate, did not retain the same benefits that had previously existed. The two-string devices of Cox patent No. 1,347,534 and Edwards patent No. 1,514,585 utilized the second string solely for maintaining circulation. When Simmons abandoned the second string and went back to the old Franklin device, he also abandoned the function of such second string, viz.: to maintain or re-establish circulation.

Simmons, therefore, does not come within the rule of *Lawther v. Hamilton,* supra, that one who eliminates a step in a process, and secures the same or more advantageous result, has made a patentable advance in the art. On the contrary, Simmons really falls within the rule of *Richards v. Chase Elevator Co.,* 159 U.S. 477, 486, 16 S. Ct. 53, that the elimination of an element with its corresponding function does not amount to invention. That is also true of process patents. *American Fruit Growers v. Brogdex Co.,* 283 U.S. 1, 51 S. Ct. 328.

The correct view, respecting the Franklin patent, was expressed by the Circuit Court of Appeals for the Fifth Circuit, as follows:

> "We find the simplicity of the Simmons method, along with all its operations, reasonably disclosed in the old patent to Franklin, No. 263,330, August 20, 1882. There is the single pipe with a packer mentioned but its function esteemed so familiar as to need no emphasis, capable of being lowered

into and withdrawn from a well, with the entrance into or escape from the pipe to be controlled by a valve operated from above while the pipe is lowered into or withdrawn from the well. The importance of Franklin to this method claim is that he describes the use of a packer on a *single string of pipe* with a valve in the pipe in the very operation of putting them in and taking them out of the well * * * He expected to get what was below the packer by a natural flow, just as Simmons in his disclosure says it is to be preferred * * * But we think that just as Simmons, when the fluid beneath whether gas or oil will not flow, closes his valve and raises his pipe to see what is in it, so one using the Franklin equipment could proceed if he wished to see what was in his pipe * * * Nor do we think it would be invention for one having a Franklin device to use it to sample a well through drilling fluid instead of using it to flow the well through water or air above the packer * * * we do not think that recurrence for this *new use* to what is in substance the simple apparatus of Franklin ought to be the foundation for broad method claims such as are here put forth." (p. 272.)

Referring to method claim 18, in particular, the Fifth Circuit Court said:

"It assumes familiar apparatus and claims a monopoly on a *new use* of the old apparatus to achieve a result in a better way." (p. 272.)

Every element which is today present in the drilling of a well was present at the time Franklin made and

described his invention. The fluids above the Franklin packer may not have been of the density of the drilling fluids of today, but that is, after all, only a matter of degree, and surely does not impart novelty in the use of an old device.

But even assuming that the method of testing a well by securing and entrapping a sample was the subject matter of patent protection, then Cox and not Simmons made that invention. The novelty of such a method does not and cannot depend on the particular apparatus used.

VII.

CONCLUSION.

With the advent of deep well drilling by the rotary method, the need of testing through mud-laden fluid became readily apparent. From that time on, permanently setting casing and bailing out was obsolete as a method of testing an oil well. Cox and Edwards were abreast of the times, and disclosed testing devices for entrapping samples in uncased mud-filled wells. Simmons, himself, was only a late comer. With the knowledge of Cox and Edwards readily at hand, it did not require the genius of invention for Simmons to use the old Franklin tool in the new environment. The skill of the calling, rather than the genius of an inventor, was all that was necessary. The rule is so well known, that we will cite only a few of the recent cases decided by this Court:

"An improvement to an apparatus or method, to be patentable, must be the result of invention, and not the mere exercise of the skill of the calling or an advance plainly indicated by the prior art." (Citing cases.) *Altoona Publix Theatres v. American Tri-Ergon Corp.*, 294 U.S. 455, 458, 55 S. Ct. 449, 458.

See also:

Concrete Appliances Co. v. Gomery, 269 U.S. 177, 46 S. Ct. 42;

Saranac Automatic Machine Corp. v. Wirebounds Patents Co., 282 U.S. 704, 715, 51 S. Ct. 232;

De Forest Radio Co. v. General Electric Co., 283 U.S. 664, 685, 51 S. Ct. 563;

Electric Cable Joint Co. v. Brooklyn Edison Co., 292 U.S. 69, 54 S. Ct. 586.

Plaintiffs, as assignees of a worthless patent, should not now be permitted to throttle an industry and mulct the public by establishing a monopoly on all oil well testing operations.

"It is as important to the public that competition should not be repressed by worthless patents, as that the patentee of a really valuable invention should be protected * * *" *Pope Manufacturing Co. v. Gormully*, 144 U.S. 224, 234, 12 S. Ct. 632.

In conclusion, we confidently assert that the method and apparatus claims in suit are invalid for lack of invention over the prior art, taken as a whole, and for that additional reason the Circuit Court of Appeals

for the Ninth Circuit was in error when it held the two method claims valid and infringed.

Dated, San Francisco, California,
January 14, 1939.

Respectfully submitted,
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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1938

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),
Petitioners,

vs.

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),
Respondents.

No. 466

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),
Cross-Petitioners,

vs.

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),
Cross-Respondents.

No 479

REPLY BRIEF OF HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION.

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Subject Index

Table of Authorities Cited

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Erle P. Halliburton and Halliburton Oil Well Cementing Company (a corporation), *Cross-Petitioners,* vs. Honolulu Oil Corporation, Ltd. (a corporation), and M. O. Johnston Oil Field Service Corporation (a corporation), *Cross-Respondents.*	No. 479

REPLY BRIEF OF HONOLULU OIL CORPORATION, LTD., AND M. O. JOHNSTON OIL FIELD SERVICE CORPORATION.

PRELIMINARY DISCUSSION OF PLAINTIFFS' BRIEF.

Plaintiffs'* brief is devoted largely to a discussion of (1) concurrent findings of fact by the District Court

*As in our opening brief, we will refer to the parties as plaintiffs and defendants.

and the Circuit Court of Appeals for the Ninth Circuit respecting the Franklin patent, and (2) references to the record in the Fifth Circuit case, including the findings of fact and conclusions of law made by District Judge Bryant, needlessly printed in full as an appendix to the brief.

1. We believe the settled rule of this Court is that (a) concurrent findings will not be disturbed unless plainly without support, and (b) ordinary questions relating to the validity and infringement of patents will not be reviewed where there is no conflict between decisions of the Circuit Courts of Appeals. *General Talking Pictures Corporation v. Western Electric Company*, 304 U.S. 175, 178, 58 S. Ct. 849, 851, and cases therein cited. Likewise, findings of the District Court on conflicting evidence, not questioned by the Circuit Court of Appeals, unless clearly erroneous, are accepted as unassailable. *Alabama Power Co. v. Ickes*, 302 U.S. 464, 477, 58 S. Ct. 300, 303, and cases therein cited.

2. While the opinion of the Circuit Court of Appeals for the Fifth Circuit is here for reference, the transcript of record in that case was filed here only as an exhibit. (Plffs. Ex. 5.) The findings of fact and conclusions of law, signed by Judge Bryant, were reversed by the Circuit Court of Appeals for the Fifth Circuit. Since the record in that case does not constitute testimony in this suit, and the lower Court's findings and conclusions were *reversed** on appeal, we believe that the frequent references by plaintiffs to what

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*Italics are ours throughout brief.

Judge Bryant did or said, in support of their present arguments, have no probative value here. However, if this Court chooses to examine that record, conclusive evidence will appear therein fully supporting the Circuit Court of Appeals for the Fifth Circuit in holding that "the idea of using one string of pipe with a valve to be closed and opened by rotating the pipe to entrap a sample below the packer was the idea of Philp." For that reason alone, both the apparatus and method claims of the Simmons patent here in suit are invalid.

In the present case the two Courts below agree that Franklin Patent No. 263,330 contemplated the existence and use of a packer on the tube below the valve; that the patent discloses a valve, operated by movement of the pipe, which valve would not leak, but in any event it would not be invention to tighten what would otherwise be a leaky valve; that the device could be used in carrying out the patented process; that the Franklin tool built, tried and tested by plaintiffs recovered an entrapped sample;* and that the Franklin patent anticipates the ten apparatus claims of the Simmons patent which are therefore invalid.

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*In Edwards v. Johnston, 44 F. (2d) 607, 612, affirmed 56 F. (2d) 49, a suit for infringement of the Edwards Patent, referred to in plaintiffs' brief, p. 4, Judge Hutcheson, then of the Eastern District of Texas, reaching a similar conclusion respecting the Franklin Patent, said: "This device, though designed for and used, not for the purpose of testing strata, but to regulate and control the flow of oil wells, had in it practically every suggestion of plaintiff's [Edwards], and witnesses testified, and I think established, that it could have been taken as it was or with mere mechanical adaptation and actually used in a rotary well as a tester".

The District Court further found "that the patent in suit was in itself an impractical device. No actual commercial use has been shown." (R. Vol. 1, p. 23.) This finding was not disturbed by the Circuit Court of Appeals.

The foregoing factual determinations are fully supported by the evidence, and the decision of the Circuit Court of Appeals for the Ninth Circuit based thereon, is not in conflict with the decision of any other Circuit Court of Appeals. Under the authorities heretofore cited, those findings respecting the patent to Franklin, are now unassailable and must be regarded as established facts.

Plaintiffs refuse to face those facts, and instead reargue the entire case, by attacking the Franklin patent with the same weapons they unsuccessfully used in the Courts below (Brief, pp. 21-42); moreover, they still persistently proclaim the wide industrial use of the Simmons invention. (Brief, pp. 53-56.)

In our opening brief we considered the Franklin patent, in the light of the prior art, as anticipating any invention in the two Simmons method claims. (Our brief, pp. 22-32; 42-47.) Plaintiffs attempt to answer that argument by a strict analysis of the precise structure described and shown in the patent itself, with their own unsupported conclusions.

Aside from that, plaintiffs continuously labor under the misapprehension that Simmons invented a new and patentable method of testing a rotary drilled well, which was a radical departure from the accepted practice of his day.

In short, plaintiffs' broad argument is that Simmons for the first time discarded the old method of oil well testing, which required the setting of casing and bailing out of fluid before a sample from the producing formation could be secured; and that he invented a new method by which such a sample could be obtained without the necessity of setting casing or removing the mud fluid. (Brief, p. 10.)

That seems to be the major premise of the argument and it is entirely fallacious. Furthermore, it ignores casing tests, for water shut-off, which the Circuit Court of Appeals for the Ninth Circuit apparently held infringed the method claims.

Doubtless having the prior patents to Cox and Edwards in mind, plaintiffs say that the Simmons sample is "uncontaminated" (Brief, pp. 13, 15, 43, 46, 74) and obtained "within a very few minutes". (Brief, pp. 13, 15, 16, 24, 25, 32, 66, 72.)

Finally the alleged Simmons method drifts off into a discussion of mechanism employed, with emphasis on the fact that the apparatus should include "a single string of pipe", rather than the particular tools shown in the Cox and Edwards patents for making the same kind of a test in drilling fluid. (Brief, p. 16.)

Plaintiffs' brief takes up each prior art patent by its four corners without any allowance for the oil drilling and testing art as it had been developed at the time these patents issued.

It is obvious that with the advent of rotary drilled oil wells, descending into the earth to the depth of a

mile or more, testing operations, of necessity, had undergone a change, for which Simmons was in no way responsible. In the case of *Edwards v. Johnston*, 44 F. (2d) 607, 612, to which plaintiffs call attention (Brief, p. 4), Judge Hutcheson of the Eastern District of Texas says of well testing that, "It is more likely that here was an evolution and not a revolution."*

In that new environment, the only practical way of testing the productivity of an oil well was to obtain a formation sample, without setting a special string of casing for that purpose and without removing the deep column of mud fluid which was then part of the new rotary drilling system.

Cox and Edwards recognized that changed condition *over five years* before Simmons filed his patent application, and their patents disclose testing tools for obtaining formation samples without the necessity of either setting casing or removing drilling fluid. Both these inventors substituted a testing tool for a rotary bit, at the end of the regular drill pipe, and lowered such testing tool into the muddy fluid of an uncased well hole, for entrapping a sample. Packers, well known in the art, were used for the purpose of sealing

***On appeal, in Edwards v. Johnston (C.C.A. 5th), 56 F. (2d) 49, it was found that "In recent years, in the southwest part of the United States, the wells run to five or six thousand feet deep. In boring these with rotary bits fastened to a drill stem composed of pipes lengthened by adding joints at the top as the well goes down, it is necessary at all times until the well casing has been finally set to keep the well full of a thin mud, the hydrostatic pressure of which keeps the well from caving and prevents the entrance of water or other things from the strata pierced. To the testing of such a well without removing this mud the Edwards patent is addressed."**

off* a restricted testing zone from the heavy fluid above. The claims of their patents are for the devices shown and it apparently did not occur to either of them that any new testing method was invented.

The Simmons tool, likewise attached to the regular drilling pipe, was intended for lowering into the muddy well fluid, under precisely the same conditions as previously contemplated by Cox and Edwards. It was provided with a packer and entrapped a sample. While his method was the same, the tool itself differed from that of the Cox and Edwards patents. Simmons used the simple Franklin rotary valve instead of a more complicated structure for accomplishing the same result as Cox and Edwards. He merely adapted the Franklin tool to the new and analogous use of well testing; or to express it in a different way, he improved the manner in which Cox and Edwards entrapped samples, by suggesting the double use of the Franklin device for testing purposes. In neither view of the matter was the exercise of the inventive faculties required for the change.

In seeking to distinguish the Simmons invention from the early prior art, plaintiffs would have it appear that a vast distinction exists between making a test in a well filled with rotary mud-laden drilling fluid rather than some other fluid encountered in drill-

*In **Edwards v. Johnston (C.C.A. 5th), 56 F. (2d) 49, Judge Sibley, after saying that bailing was too expensive for testing, continues: "A more simple method is to separate the fluids above from the fluids beneath by a 'packer'; that is, some mass which will fit the well water and gas tight, and to extend a tube from the mouth of the well through the packer to the well bore beneath it. This packer early assumed two forms. * * *"**

ing operations. (Brief, pp. 7-9.) But this apparent difference immediately disappears when the prior art fluids are considered, for after all it was not Simmons' conception that testing, or other tools, could be operated under drilling fluid. That was done by persons preceding him and was well known in the art. Fluids have always been present in well drilling, and although perhaps not of the same consistency as present day drilling fluid, still the problem of sealing off the producing area to be tested from the remaining fluid was the same before as after modern rotary drilling took hold. Similar types of packers and valves were used in wells filled with rotary fluid as in those in which native liquids were found.

Eliminating then this misleading distinction between drilling and other fluid, we find substantially the alleged Simmons invention in the Burr & Wakelee patent* (R. Vol. 2, p. 328) of 1867, which discloses an apparatus for testing deep uncased oil wells, consisting of a pipe, carrying a packer for sealing off a formation to be tested from the well fluid above, and means for securing a sample from such formation, at the top of the well, for the purpose of testing. (R. Vol. 1, pp. 233-236.)

It is particularly noteworthy, in view of plaintiffs' present argument, that the Burr & Wakelee patent shows an oil well testing tool embodying "a single string of pipe"; that it is for use in an uncased well

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***Discussed in plaintiffs' brief, p. 52. This patent was not cited by the Patent Office during the prosecution of the Simmons application.**

hole in which fluid is present; that the testing is accomplished "without maintaining circulation"; and that "an uncontaminated sample" must necessarily be recovered.

Whatever inventive genius there may be in the now asserted Simmons testing method is the necessary and intentional function of the apparatus disclosed as early as 1867 in the Burr & Wakelee patent. Wells, at that time, ran to a depth of from 1500 to 2000 feet (R. Vol. 1, p. 236) and did not contain specially prepared drilling fluid, because the rotary system had not come into vogue. But if there was any patentable novelty in adapting an oil well testing tool which secured a sample from a restricted formation area, to the changed condition under which artificially prepared fluid was present, then the invention was that of Cox and not of Simmons. The Cox patent discloses a tool which will entrap a sample beneath the rotary drilling fluid within an uncased well hole.*

*In Edwards v. Johnston, 44 F. (2d) 607, 613, affirmed 56 F. (2d) 49, Judge Hutcheson said of the Cox Patent:

"So complete is the disclosure of this patent that whatever may be said about its inoperability or the inoperability of the particular form described in the specifications and shown in the drawings because of something over or under in its description, not only any ordinary mechanic, but the proverbial wayfaring man, with that patent in hand, and with the earlier patents to aid him, would not err in the way, for he could easily devise some method of doing the very thing which plaintiff claims his device does, and, while it may be that in view of his patent plaintiff should have protection limited to the very device he describes and shows, it is perfectly plain to me that no broad protection may be accorded him."

SIMMONS' SO-CALLED PRIMARY FEATURES.

It is hornbook patent law that the claims of a patent must define the measure of the invention. But plaintiffs in their brief prefer to summarize what they term the "primary features" of the Simmons invention, in two synthetic claims of their own wording:

> "(1) The test is made with a single string of pipe without removing the drilling fluid and without maintaining circulation of drilling fluid". (Brief, p. 16.)

We have already shown that by using the Burr & Wakelee patented apparatus a test could be made in precisely the same way in natural drilling fluid as when a special mixture of mud and water was employed. We selected the Burr & Wakelee patent only as one example of the prior art, but substantially the same method results by using the apparatus disclosed in Lyons Patent No. 46,124 of 1865 and Cooper Patent No. 1,000,583 of 1911.* So likewise with the Franklin device used as a tester. (Our Opening Brief, pp. 22-32.) Plaintiff Halliburton had to admit that Franklin discloses a tool which would entrap a sample in the rotary drilling fluid of a well. (R. Vol. 1, pp. 478-479.)

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*These two patents are analyzed in plaintiffs' brief, pp. 52 and 53. In Edwards v. Johnston, 44 F. (2d) 607, 613, Judge Hutcheson, in considering the Cooper patent, said:

> "I think it wholly immaterial to determine whether the Cooper patent as described would operate below a thousand feet or not, for it gave the plaintiff and any others such information, in the light of the state of the art, as to the theory of the process as that to make it operative at 3,000 feet or any other depth required the exercise of no inventive genius, but merely the application of mechanical trial and error to adapt the device for use at any required depth."

If making a test with "a single string of pipe" is one of the primary features of the Simmons invention, one would expect to find some mention of it in the patent description. Many other objects of the invention are stated. (Patent, p. 1, lines 75-100.) The importance of the "single" string of pipe, according to the brief, was to make a test "without maintaining circulation of drilling fluid".

But the Simmons patent makes no reference whatever to a test "without maintaining circulation of drilling fluid". The patent does not even mention circulation, in that it either occurs or does not occur, during the testing operation. Only by reading plaintiffs' brief would the public become aware of this primary feature of the alleged invention. There is no teaching in the patent that circulation of drilling fluid bears any relation whatever to well testing.

Indeed, our own view of the matter is that they are separate and independent and should not be confused.* If the circulation of drilling fluid, either through the standard drill pipe or in any other way, prevents well tools from "freezing" in an uncased hole, that has nothing to do with a testing method.

It appears to us that plaintiffs, in their eagerness to distinguish the Simmons method from the prior art, go entirely outside the patent. If elimination of circulation during testing was a primary part of the Simmons invention, as now contended, some mention of

*In Edwards v. Johnston (C.C.A. 5th), 56 F. (2d) 49, 50, the Court treated the Edwards patent as disclosing a single string device.

that fact must appear in the patent itself, otherwise the disclosure is insufficient.

> "(2) An entrapped and substantially uncontaminated sample is recovered, thereby giving a measure of the productivity of the formation tested." (Brief, p. 16.)

Plaintiffs in this second feature seek to avoid the Cox patent, which entraps a testing sample in rotary drilling fluid, by saying that the Simmons sample is "uncontaminated". Of course, the character of sample, whether contaminated or not, is really the result of and not a step in the method itself. In the Franklin device the sample would have the same purity as with Simmons.

The Simmons patent speaks of the sampling of "cognate" or related fluids encountered in drilling, whether oil, water or gas. (Patent, p. 1, lines 20-23.) Sometimes there is an emulsification (R. Vol. 1, p. 43); then again the test may be negative; at other times a column of water will ascend the drill pipe with oil underneath. (R. Vol. 1, pp. 42-43.) The muddy "rathole" fluid usually goes up the drill pipe in advance of the sample. (R. Vol. 1, pp. 384-385.)

The record is clear that the drilling and formation fluids are easily identified. (R. Vol. 1, pp. 385-386; 501.) They remain substantially in their same relative positions. If that is so, what difference does it make if in using the Cox device some drilling fluid may pass through the check valve, and follow the entrapped formation sample up into the drill pipe?

In the use of the accused Johnston device, mud is occasionally put into the drill pipe purposely, for a thousand feet or more, to prevent it from collapsing. When formation fluid enters, the narrow column of mud is merely shoved upward in the pipe and after it is removed a substantially "uncontaminated" sample results. (R. Vol. 1, pp. 384-385.)

As for measuring the productivity of the formation, that forms no part of the testing method, and is not mentioned in the patent either. The sample may be insignificant or it may consist of a fluid column several thousand feet in height (R. Vol. 1, p. 43), the amount depending upon the formation pressure and the length of time the valve is open. But if accurate measuring is a feature, the patent does not say how it is accomplished. The Cox sample is substantially uncontaminated and it will therefore give some measure of the productivity of the tested formation in the same manner as contended for Simmons; so will a test made with the Franklin device.

The primary features of the Simmons invention, assuming them to be patented, really possess no novelty over the prior art. It is only by arguing Cox without the teachings of the Burr & Wakelee, Lyons or Cooper patents; or the latter three patents without Cox; or by limiting the Franklin device to the precise structure and use described, without considering the general state of the art, that any novelty whatever can be imparted to the Simmons method, even under plaintiffs' own theory of what that patent discloses.

For the convenience of the Court we have prepared an analysis of Simmons claim 8 (method) and claim 15 (apparatus), noting where the various steps or elements are found in the prior art. These are the two claims selected by plaintiffs, (Brief, pp. 13, 14) and are as follows:

CLAIM 8.

"**A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes**

1. **lowering an empty string of pipe into the well (early publications, Franklin, Cooper, Cox, Halliday, Edwards)**
   (a) **through the drilling fluid (same)**
   (b) **to adjacent the formation, (same)**
2. **the pipe carrying**
   (a) **a packer (early publications, Lyon, Burr & Wakelee, Franklin, Cooper, Cox, Edwards, Halliday)**
   (b) **and having a valved inlet at its lower end (Franklin, Cooper, Cox, Edwards, Halliday)**
   (c) **which is closed while the pipe is being lowered, (Franklin, Cooper, Cox, Edwards)**
3. **setting the packer above the formation to seal off the drilling fluid from the formation, (early publications, Lyons, Burr & Wakelee, Cooper, Cox, Franklin, Edwards)**
4. **opening the valved inlet after the packer is set (Franklin, Cooper, Cox, Edwards, Halliday)**
   (a) **to permit cognate fluid from the formation to enter the pipe, (same)**
5. **closing the valved inlet against the entrance of fluid from the well (same)**
   (a) **by movement of the pipe, (same, except Cooper)**
6. **raising the pipe so closed (same)**
   (a) **to remove an entrapped sample and (same)**
   (b) **the packer from the well." (same)**

CLAIM 15.

"Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising

1. a single empty string of pipe to be lowered into the well (early publications, Lyons, Burr & Wakelee, Franklin, Cooper, Cox, Edwards, Halliday)
   (a) through the drilling fluid (same)
   (b) to adjacent the formation to be tested, (same)
2. a packer (same)
   (a) lowered into the well by said string of pipe (same)
   (b) for sealing off the drilling fluid from the formation to be tested, (same)
   (c) said packer adapted to be positively pressed against the walls of the formation to seal off the same, (same, except Halliday)
3. means at the lower end of said string of pipe (same)
   (a) to receive fluid from said formation (same)
   (b) including an inlet opening into said pipe below said packer, and (same)
4. a valved structure for controlling the inlet (Franklin, Cooper, Cox, Edwards, Halliday), said valve structure having
   (a) a relatively stationary part connected to the packer and (Franklin, Halliday)
   (b) a relatively movable part connected to the pipe." (Franklin, Halliday)

PLAINTIFFS' ARGUMENT AS TO FRANKLIN PATENT.

It is assumed, contrary to the patent, that Franklin discloses a permanent installation of a rotary valve at a point in the flow pipe high in the well hole; and that the device is not capable of establishing an empty sample chamber within the well bore "for only a few minutes". (Brief, p. 25.) On that basis plaintiffs

paint an imaginary picture of "cave-ins" and "freezing" which would cause the Franklin tool to stick in the uncased well on removal. after entrapping a sample.

But plaintiffs purposely overlook the fact that structurally, in all material respects, the Franklin and Simmons tools are identical and that the precise tool disclosed by the long expired Franklin patent has been successfully used as a tester without modification or change to entrap a sample, under rotary drilling conditions as they exist today. The two Courts below agree on that fact. established in this case. and clearly supported by the evidence. An empty sampling chamber could be established in the Franklin tool for any desired length of time.

The Latham patent is cited (Brief, p. 31) as showing that the Franklin tool could be rotated without the lower end held against rotation by the packer. On turning to that patent, however, we find that Latham uses a flatsided chisel member which is driven into the formation below. in order to prevent rotation. a device not referred to by Franklin.

It is said that our assembly of the Franklin valve with the well of 1880 falls short of the Simmons tool in the four following respects (Brief, p. 32):

1. In the drawing opposite page 25 of our opening brief, say plaintiffs, the pipe is broken away between the packer and inlet at the bottom of the pipe, indicating that the packer is a "substantial distance" up the well. But our drawing of the 1880 well was taken from the Carll Report, and can be seen better by turn-

ing to the Transcript of Record, Vol. 2, p. 440, where the exhibit is reproduced in enlarged form. An examination of Fig. 4 shows that the flow pipe and not the strata, is broken away, between the packer and bottom inlet, in a portion plainly marked "bottom section", whereas *both the strata and pipe* are broken away in three places between the packer and derrick floor. It leaves no doubt that the packer is deep in the well hole in the "bottom section". In fact, a close observation of this drawing shows what is there called a "perforated pipe", the words appearing on the drawing approximately half the distance between the pipe bottom and the packer, in the section termed "oil sand". Plaintiffs have therefore made an obvious error in reading the 1880 drawing, which shows the packer in substantially the same position on the pipe as that disclosed in the Simmons patent. It is really absurd to think that Franklin would put his packer any great distance above the producing formation and so disregard the knowledge of his time that the packer was to exclude fluids entering the well above the producing zone, defeating the very purpose he had in mind of securing the operation of a flowing well. If any doubt existed as to the proper location of a packer when testing, then the problem had already been solved by Lyons, Burr & Wakelee, Cooper, Cox, Edwards and Halliday, some of them preceding Franklin, but all earlier than Simmons.

2. The argument is that if the valve is positioned any substantial distance above the inlet adjacent the formation (which it is not), no accurate test can be made. Franklin, of course, says that his device may be

placed "deep in the well" and "at a point above the packer". That is exactly where we placed it in our drawing. So placed, it completely refutes plaintiffs' argument respecting a "brief test period" and "accuracy" of Simmons, over the Franklin valve used in the flow device of 1880. The length of time in testing depends entirely upon conditions found in the well. (R. Vol. 1, p. 41.) The "spaced relationship" of the major elements of the Simmons tool (Brief, p. 34) are substantially the same as in our drawing.

3. The third deficiency found by plaintiffs in the Franklin patent is that the valve is incapable of retaining and carrying to the surface an entrapped sample and that it was intentionally designed to permit the escape of fluid above the valve. (Brief, p. 35.) This fallacious contention is directly contrary to the plain statements in the patent, as pointed out in our opening brief. There could be no more leakage around the valve parts than between the valve faces of Simmons.

4. Finally, it is asserted that the drilling fluid from above would leak through the open valve structure, if used for testing, and impose itself on the formation below the packer, and the test be destroyed. Leakage in that manner would defeat Franklin's purpose. In the alternate solid disk type of valve, described in the patent, and appearing opposite page 28 of our opening brief, no leakage is possible. Both lower Courts here hold that the device will entrap a sample and the Appellate Courts agree that it would not involve invention to tighten a leaky valve.

COX AND EDWARDS PATENTS DISCUSSED.

The Cox and Edwards patents are then taken up and plaintiffs, making the best of the situation, assert that they, themselves, rely on these patents as "evidence that what Simmons did was invention". (Brief, p. 42.) The argument is that men of inventive ingenuity believed "circulation was an indispensable step in the testing procedure" which constrained them to provide two strings of pipe, "an outer string to maintain the circulation of the drilling fluid" and "an inner string to make the test". (Brief, p. 42.) Cox and Edwards use only one string of regular drill pipe, as does Simmons, but inside that drill pipe, Cox shows a flexible hose, which plaintiffs term "an inner string", while Edwards shows a small pipe substituted for the flexible hose.

The expression "without maintaining circulation" is shrouded in mystery throughout plaintiffs' brief. The reason for circulating muddy fluid down through the drill pipe and up through the uncased hole is to prevent cave-ins, plaster the well hole, keep fluids from entering the hole, stop tools from "freezing", and remove cuttings from the bit. (Brief, p. 8.) No circulation is necessary in a cased hole. But quiescent muddy fluid will do the same thing, when drilling ceases, as when the fluid is in circulation, according to Halliburton's own testimony. (R. Vol. 1, p. 39.) On his own accord he had found that a test could be made without the hazard of the pipe sticking when the mud in the hole was quiescent. (R. Vol. 1, p. 46.)

What difference is there, then, in making a test through quiescent mud, as Simmons did, or circulating

mud as Edwards preferred? The Cox tester can be used in either way. Defendants' expert Abbett said that "circulation in Cox is entirely independent of any testing operation * * * both can go on at the same time or either could go on without the other." (R. Vol. 1, pp. 318-319.) The apparatus of Cox and Edwards is so constructed that circulation may be maintained while the testing operation was going on. Even in plaintiffs' new J-Slot tester, circulation can be re-established after the test is made, which is also true of defendants' accused tester. Plaintiffs say that when circulation is re-established in present day tools the sample is lost. (Brief, p. 65.) But that is of little moment if the "freezing" of the tester is prevented by the circulation.

In any event, the drilling fluid referred to, whether quiescent or in motion, is above the packer sealing the restricted formation area tested, from such fluid. It is therefore immaterial to any *testing method* whether the fluid above the packer is in circulation or not, while making the test, because the heavy fluid itself and not its circulation maintains the well hole; and if "freezing" occurs after the test is made and while the entrapped sample in the tool is removed, both plaintiffs' (R. Vol. 1, pp. 120-121) and defendants' (R. Vol. 1, pp. 166-167) testers can re-establish circulation. The flexible hose of Cox and the extra pipe of Edwards accomplish the same result as the auxiliary circulating valves of the modern testers, but with the added advantage that if circulation is re-established, or is "maintained" during testing operations, the Cox and

Edwards samples, because of a second conduit, would not be lost.

The only benefit we can see in eliminating the second string of Cox and Edwards and reverting to the single tube of Franklin, is to make the tool simpler of operation, ~~and cheaper in~~ construction, both mechanical advantages immaterial to any method. If it is important in present practice to re-establish circulation, when necessary, after the test is completed, even by losing the entrapped sample, why must plaintiffs resort to the hairsplitting argument that Simmons found "maintaining" circulation was not necessary, but "re-establishing" circulation still desirable? In any event, "circulation" itself is an important attribute of any testing tool, not as a part of a testing method, but to facilitate the removal of the tool itself after the sample is entrapped.

The Simmons patent dispenses with all circulation, going back to the Franklin, Lyons, Burr & Wakelee, and Cooper disclosures and, as stated in our opening brief, is really a step backward rather than forward.

Plaintiffs say that the time required to run a two string tester is prohibitive. (Brief, p. 51.) On the whole, it appears more economical to provide an extra circulating valve rather than a complete string of pipe; but on the other hand, if the tester should "freeze" on withdrawal, as plaintiffs so constantly remind us, the use of a circulating valve would destroy the sample and the well would have to be retested, whereas the extra circulating string would preserve such sample because in the double string device the testing operation is independent of circulation.

OTHER WELL TESTERS OF THE PRIOR ART DISCUSSED.

Plaintiffs next criticize the remaining prior patents separately, carefully avoiding the combined state of the entire art at the time of Simmons, and, of course, omitting any similarities to the patent in suit. (Brief, p. 52.)

We have already referred to the Lyons, Burr & Wakelee and Cooper patents in this brief. The publications were fully considered in our opening brief.

Macready Patent No. 1,522,197 of 1925 (Brief, p. 53), included by plaintiffs, discloses a method of making production tests in the lower portions of deep rotary drilled wells, showing a "rat-hole" and "rat-hole packer" similar to that of the Simmons patent.

Plaintiffs are unwarranted in minimizing the prior art patents yet at the same time grossly exaggerating the alleged invention in issue. In all fairness, the same yardstick should be applied to the prior art patents as is used in measuring the patent in suit.

ALLEGED WIDE INDUSTRIAL USE.

The fallacious argument respecting the commercial use of the Simmons tester is again repeated (Brief, pp. 53-56), in spite of Judge Cosgrave's finding of fact, not disturbed on appeal, that "no actual commercial use has been shown".

The device of the Simmons patent has never been used except in three experiments, with one such tester. Plaintiffs' commercial structures do not re-

spond to the disclosure of the patent. (R. Vol. 1, pp. 422-427; 23.)

Some of the language used by plaintiffs' present counsel in the prosecution of the abandoned Halliburton patent application (R. Vol. 2, pp. 236-314), against the Simmons tool, is as harsh as anything we have ever said against it; "It provides a device which has the disadvantage that it will stick in operation," (R. Vol. 2, p. 303) and other similar statements. All the exaggerated claims now made for Simmons were there made for the Halliburton Stop Cock and Gear tester, and then transferred back to the Simmons device, when the Halliburton patent application was rejected by the Patent Office and abandoned.

In view of plaintiffs' present animosity toward two-string testers, it is difficult to believe that the Halliburton tool shown in his application as filed, really was for a two-string device. Yet that was actually so. Turning to the drawing, it will be seen that the usual pipe or conduit is numbered 2, and within it the tubing 41, of considerably less diameter, somewhat like the flexible hose of Cox, extending "upwardly for a considerable distance" (R. Vol. 2, pp. 247; 312) for testing "an extremely deep well". (R. Vol. 2, p. 248.) A strainer and rat-hole packer are also utilized, similar to those shown in the Simmons patent. (R. Vol. 2, p. 312.)

The same Halliburton who intended to use a two-string tester in a deep well hole is now given by plaintiffs as authority for the statement in the brief that

"two-string testers have never succeeded and are nowhere in use today". (Brief, p. 51.) Even though he had purchased the Simmons application, he was not aware of one of the "primary features" of that invention said to reside in only "a single string of pipe".

But whatever inconsistencies there may be, the established fact is that the only successful testers employed by plaintiffs were the Stop Cock and Gear device and the recently developed J-Slot tool, and not the Simmons form, which was only used experimentally to the extent of three tests in all.

Plaintiffs go entirely outside the present record when they say that the parties to the earlier suit of *Edwards v. Johnston*, 44 F. (2d) 607, affirmed 56 F. (2d) 49, threw a "false light" (Brief, p. 58) on the testing art because they knew of the then pending Simmons patent application, yet did not reveal it to Judge Hutcheson during the trial. Even if that was so, the defendants here were not parties to the suit. If Judge Hutcheson had no knowledge of Simmons in the earlier case, manifestly he had full knowledge of his alleged invention and patent in the later case of *Johnston v. Halliburton*, 88 F. (2d) 270, for he was one of the appellate judges who concurred in the decision, invalidating the two Simmons method claims.

ALLEGED INFRINGEMENT.

Plaintiffs would prevent us from arguing non-infringement, if we assume valid claims, because they

say that particular question was not raised by our petition for certiorari. (Brief, pp. 2, 61.)

We are at a loss to understand such an inaccurate and unfair statement.

In our petition, under the heading of "Reasons Relied on for Allowance of Writ" we concluded as follows:

> "The Circuit Court of Appeals for the Ninth Circuit therefore erred in holding the two method claims valid and *infringed.*" (Petition, p. 6.)

Our supporting brief says that if the two method claims are valid "then the further question might arise as to whether the petitioners have infringed those claims". (Supporting Brief, p. 9.)

It is quite apparent why an attempt is made, on technical grounds, to confine the issue to validity only. Plaintiffs realize that the arguments which they have tried to develop with respect to the omission of "circulation", by reason of a "single string of pipe", and securing an "uncontaminated sample", etc., have no application whatever to the *casing* tests, made by defendants. These, comprising approximately one-third of all tests made, are fully discussed in our opening brief (Our Brief, pp. 32-35), where we showed that the use of defendants' tool in water shut-off tests was "obviously not an infringement under any theory of this case". (Our Brief, p. 56.)

Plaintiffs have not answered that argument. Indeed, throughout their brief, scarcely any reference is made

to water shut-off tests, in which the tool is lowered through a cased well and the packer set against the metal casing and not in the open well hole.

If a casing test does not come within the scope of the patent, it is difficult to recognize invention when the same apparatus is used in the open formation.

All the claims in suit are limited to formation tests, because the Patent Office required that restriction to be expressly inserted, for which reason casing tests are plainly outside the scope of the Simmons patent.

Plaintiffs select apparatus claim 15 for reading on defendants' device (Brief, pp. 63, 64), but omit to quote the following introductory phrase:

> "Apparatus for testing the *productivity of a formation* encountered in a well containing drilling fluid."

Nor do they set out, as with other elements, the important limitation in the body of the claim:

> "said packer adapted to be positively pressed against the walls of the *formation* to seal off the same".

Tracing the history of claim 15, we find that it was first submitted to the Patent Office, without the last above quotation, in an amendment dated June 17, 1927. At that time the claim was numbered 32 and, as such, appears in the Simmons file wrapper. (R. Vol. 2, p. 72.) On December 4, 1929, the Patent Office rejected that claim in the following language:

> "Additional references of record:
> Halliday 1,474,630 Nov. 20, 1923
> " 1,510,669 Oct. 7, 1924
>
> * * * * * * * *
>
> Claims 26-36 and 37 are rejected as being completely met by Halliday. Attention of the applicant may be called to the fact that Halliday's device can be manipulated to close all the ports and further manipulated to open only the ports below the packers whereby the device can be used as a well tester." (R. Vol. 2, p. 104.)

Thereupon applicant's attorney, after a personal interview with the Examiner (R. Vol. 2, p. 108), amended claim 32 by inserting after the word "tested":

> "said packer adapted to be positively pressed against the walls of the formation to seal off the same". (R. Vol. 2, p. 107.)

The inserted limitation distinguished that claim from the Halliday patents which showed the packer pressed against the interior of an oil well *casing*. So amended, the claim was allowed, the number being later changed from 32 to 15. (R. Vol. 2, p. 72.)

The selection now of claim 15, to urge infringement is particularly unfortunate for plaintiffs, because it fits our argument exactly. No appeal was taken from the Patent Office ruling and plaintiffs are bound by that limitation. (Our Brief, pp. 35-37.)

In the very recent case of *Mackay Radio v. Radio Corporation*, ... U.S. ......, 59 S. Ct. 427. 434. opinion by Justice Stone, it was said:

"Carter, avoiding prior art by defining his angle for antennae with wires of particular wave lengths with mathematical precision, cannot discard that precision to establish infringement." (Citing cases.)

A casing test is made when the conditions referred to in the Simmons patent as a part of the prior art, are encountered:

"If a water sand has been encountered above the formation to be tested, it is necessary to run in a string of casing and cement or otherwise seal its bottom to the sides of the well bore at a point below the known water level, in order to protect the formation being tested from this upper water strata." (Patent, p. 1, lines 49-55.)

In the first portion of plaintiffs' brief they set forth. "The issue to be reviewed, as to the method claims". and then quote at length from the opinion of Judge Wilbur, as follows (Brief, p. 5):

"Simmons faced the problem of providing a method of testing an oil well without removing the hydrostatic pressure necessary for *supporting the formation in place.*"

No such problem is presented in a cased well. Another part of the same opinion, quoted in plaintiffs' brief (p. 6), is:

"The patentee discovered that a well could be safely tested by the lowering of a single string of pipe equipped with a valve packer and strainer and that it was *not necessary to set the casing permanently* * * *".

Water shut-off casing tests contemplate the permanent setting of casing. Simmons says so himself, "The cemented water string, however, must be left in the hole". (Patent, p. 1, lines 66-67.)

Judge Wilbur, in referring to the invention, is further quoted in plaintiffs' brief (Brief, pp. 5-6):

> "This discovery constituted invention for it disclosed what had not been thought possible in the art, that is, that such a device could be set in a well containing drilling fluid while there was no circulation thereof long enough to make a test."

It is evident that the learned jurist failed to take into account that no such problem could possibly arise with a well that had a string of casing for keeping out water. No one had thought it impossible to insert a tester or in fact any well tool down through the *casing* of the well, even though it contained drilling fluid not in circulation, because no crumbling of the walls or freezing could then occur. In such a test the packer must seat against the casing and does not go beyond its end, as that would defeat the very purpose of the test. (Our Opening Brief, drawing opposite p. 32.)

Plaintiff Halliburton admitted that water shut-off tests would not infringe the apparatus claims of his patent, saying:

> "All those claims that are limited to pressing the packer against the formation wouldn't come within the use of setting a packer within a string of casing. I don't think." (R. Vol. 1, p. 130.)

This is not the unwitting admission of an ordinary plaintiff, for Judge Wilbur calls him "an expert patent lawyer and a mechanical engineer familiar with the oil industry". (R. Vol. 1, p. 529.)

The distinction between formation and casing tests is important for two reasons: (1) If casing tests are entirely outside the scope of the Simmons invention, then defendants infringe neither the method nor apparatus claims, in at least one-third of the accused tests; and (2) If the claims are necessarily so restricted, viz., that the only novelty was to use the Halliday apparatus and method, for testing uncased rather than cased well holes, then such novelty obviously did not amount to patentable invention.

In either view of the matter, the Circuit Court of Appeals for the Ninth Circuit reached an erroneous conclusion on the infringement and validity of the method claims.

For the reasons given in our opening brief (pp. 54-62), which apply to all tests made by defendants, and because casing tests particularly are entirely outside of the invention now attributed to Simmons, there is no infringement, even if the claims are assumed to be valid.

OUR ASSIGNMENTS OF ERROR.

In answer to our assignment 1, that the method claims merely describe the function of an apparatus intended for a particular use, plaintiffs reply that manual operation is necessary, since their "apparatus

may be lowered into the well and yet nothing will happen until the apparatus is manipulated". (Brief, p. 68.)

Every apparatus requires some manual operation in order to accomplish its intended purpose. In *Risdon Iron & Locomotive Works v. Medart,* 158 U.S. 68, referred to in our opening brief, manual operation was necessary to operate the machines required to practice the alleged process, yet this Court held the process to be but the function of the machine. In *Westinghouse v. Boyden Power Brake Co.,* 170 U.S. 537, 18 S. Ct. 707, also in our brief, manual operation was required to operate the air brake, but the Court nevertheless held that a functional claim was not allowable.

We see in the terms of the method claims only a statement of the action or function of the apparatus, so closely related thereto as not to be separably patentable as a distinct method. Such a method is incomplete without apparatus, and since the apparatus would not support valid claims, we do not see how the process claims can be valid.

In *Holland Furniture Co. v. Perkins Glue Co.,* 277 U.S. 245, 257; 48 S. Ct. 474, cited in our opening brief, Justice Stone, writing the opinion of this Court, said:

> "That the patentee may not by claiming a patent on the result or function of a machine extend his patent to devices or mechanisms not described in the patent is well understood." (Citing cases.)

It seems to us that Simmons comes within the prohibition mentioned. The mere fact that manipulation is

necessary to position the tool where it will accomplish its desired result, after which the valve is opened and closed, does not detract from our argument. Here the alleged method is absolutely dependent on the function of the apparatus and manual action is only indirectly required for operating the tool, not for performing a step in the process. The method itself cannot be performed by hand, without the aid of mechanism. (Brief, p. 87.)

With knowledge of the Franklin and other prior patents relating to testing, one skilled in the art would understand by mere inspection, how to operate the Simmons device for making a test.

The two cases to which plaintiffs call attention (Brief, p. 69) hold that a process may be novel, although a device which is used in only one step of such process, may itself be old. In neither case did the process claims, as here, describe "the manner in which the apparatus was designed and intended to be used". We repeat, with our own emphasis, plaintiffs' quotation from *Naivette, Inc. v. Bishinger,* 61 F. (2d) 433, where the Court stated:

> "There is no contradiction in sustaining validity of a process, which includes clamping as a *step* in a new *combination*, and yet to deny validity to the patent for a clamp as a unitary device."

The patentability of the Simmons method over his apparatus must be decided by the same rules which would be applied to test their anticipation by a patent to another. They are not separate and distinct inventions.

Our assignment 2, relating to lack of invention in the two method claims over Franklin, has already been considered.

Our assignment 3 was that the new use of an old apparatus did not involve invention. Plaintiffs reply (Brief, p. 70) that the correct rule is stated in *Pennsylvania R.R. v. Locomotive Truck Co.*, 110 U.S. 490, 494, to which we agree. Simmons applied the old Franklin tool to a new use without any modification in the device itself. There was "no change in the manner of application" and no distinct or unexpected result derived. If the new use, viz., securing a sample, constituted the alleged novelty, then such samples, for testing, had been secured in oil wells long before the time of Simmons. A mere result is, of course, not patentable, notwithstanding plaintiffs' suggestion that Simmons secured "a new result substantially distinct in its nature, and never contemplated by Franklin". (Brief, p. 71.)

In assignment 4 we contended that the method claims depend for their novelty upon mechanical limitations, expressly placed there to avoid the prior art, to which plaintiffs feebly reply, that these limitations constituted only "an appropriate expression" (Brief, p. 72) agreed on by the Examiner and applicant. Whether in appropriate language, or otherwise, mechanical restrictions inserted in the process claims secured their allowance. The novelty, therefore, resides in mechanical means and not the steps of any true process. Under the views recently expressed by this Court in *Smith v. Hall*, 301 U.S. 216, 57 S. Ct. 711, the method claims are invalid for that reason alone.

Plaintiffs take exception to our definition of a patentable process in assignment 5, citing several opinions of this Court. In *Corning v. Burden*, 15 How. 252, relied on by plaintiffs and cited in our opening brief, this Court defined a "new and useful art", citing as examples, "tanning, dyeing, making water-proof cloth, vulcanizing India-rubber, smelting ores and numerous others". All of these methods contemplate a tangible thing which is changed in some new and useful manner. While an apparatus or machine, if new, may be patentable as such, we do not believe this Court ever intended to extend the statutory word "art" to include the intangible "testing" method contemplated by the Simmons patent. It was only the device itself, which, if new, was patentable.

Plaintiffs stress *Eames v. Andrews*, 122 U.S. 40 (Brief, p. 75), in which the validity of the reissued "driven well" patent was sustained, but six months later, the same patent was declared invalid in *Andrews v. Hovey*, 123 U.S. 267.

THE LAW APPLICABLE TO THIS CASE.

Plaintiffs have attempted to state the law applicable to this case under fifteen separate items at the conclusion of their brief. (Brief, pp. 76-87.) It is impossible within the limits of this reply to take up each of these separate items. We will therefore rely on our own citation of authorities in both this and our opening brief as controverting any disputed points.

CONCLUSION.

In conclusion, we summarize our defense as follows:

1. The Simmons apparatus claims are invalid for want of invention over the disclosure of the Franklin patent in view of the state of the art then existing.

2. The invalidity of the apparatus claims, concurred in by the trial and appellate courts in this suit, fully supported by the evidence, is not in conflict with any decision of another Circuit Court of Appeals, and under the established rule of this Court, will not be reviewed.

3. The apparatus is a part of the public domain, and the patent laws, under the guise of so-called method claims, will not grant a monopoly on the special use to which an old device may be put.

4. The method claims are invalid for want of invention over (a) the Franklin patent in view of the remaining prior art as particularly represented by the Lyons, Burr & Wakelee, Cooper, Cox, Edwards and Halliday patents, each of which discloses a well testing device, and the publications of Carll, Packham and Chamberlin, or (b) the testing methods necessarily disclosed in those prior patents, in view of the Franklin apparatus.

5. The circulation of drilling fluid to sustain the walls of an uncased hole forms no part of a testing method and is not even mentioned in the patent.

6. Simmons did not invent a patentable testing method, by disclosing a device which utilized only "a single string of pipe" and "without maintaining circulation".

7. Entrapping a "substantially uncontaminated sample" and "giving a measure of the productivity", is not included in any claims and moreover is not invention over the prior art.

8. The Simmons method and apparatus for making formation tests are not patentably different over the former Halliday method and apparatus which could be used for making casing tests in oil wells.

9. The method claims are invalid for the other reasons set forth in our assignments of error.

10. The idea of using one string of pipe with a rotating valve to entrap a sample below the packer was the idea of Philp and not of Simmons, and while the testimony itself is not in the present case, strictly speaking, the opinion of the Circuit Court of Appeals for the Fifth Circuit at least shows the small part that Simmons actually played in the development of the oil well testing industry.

11. Plaintiffs have apparently abandoned "water shut-off" casing tests in their charge of infringement, thereby in effect admitting that those tests do not come within the scope of the alleged Simmons invention.

12. All the claims in issue were expressly limited to formation tests by a Patent Office requirement and they cannot now be construed to include casing tests.

13. The patent claims must be narrowly construed, if valid at all, because the Simmons device is impractical and has never been commercially used.

14. The use of defendants' patented device, differently constructed and operated from that of Simmons, is not an infringement of any valid patent claims.

15. In no view of the matter are defendants' water shut-off casing tests infringements of any of the patent claims.

It is submitted that the Circuit Court of Appeals for the Ninth Circuit should be affirmed in respect to the apparatus claims, and reversed, because of errors in law and fact, on method claims 8 and 18, as those claims are invalid.

Dated, San Francisco, California,
February 27, 1939.

Respectfully submitted,

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FILE COPY

Supreme Court of the United States

OCTOBER TERM, 1938.

Nos. 466 and 479.

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),

Petitioners,

vs.

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),

Respondents,

and

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation),

Cross-Petitioners,

vs.

HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation),

Cross-Respondents.

ON WRITS OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT.

BRIEF FOR THE RESPONDENTS.
(And Cross-Petitioners)

FREDERICK S. LYON,
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LEONARD S. LYON,
HENRY S. RICHMOND,
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Attorneys for Respondents.

SUBJECT MATTER INDEX

TABLE OF CASES

PAGES

STATUTES CITED

IN THE

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HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation), *Petitioners*, vs. ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation), *Respondents*,	No. 466
and	
ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING COMPANY (a corporation), *Cross-Petitioners*, vs. HONOLULU OIL CORPORATION, LTD. (a corporation), and M. O. JOHNSTON OIL FIELD SERVICE CORPORATION (a corporation), *Cross-Respondents*.	No. 479

BRIEF FOR RESPONDENTS

(Plaintiffs below)

This cause is here on writs of certiorari issued to the Circuit Court of Appeals for the Ninth Circuit because of conflict between the decision of that court (98 F. (2d) 436 and I, 524)* and an earlier decision of the Circuit Court

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*The record will be referred to by giving the volume in Roman numerals followed by the page in Arabic numerals.

of Appeals for the Fifth Circuit in a suit brought by plaintiffs below against Johnston Formation Testing Corporation and Edgar C. Johnston (88 F. (2d) 270).

STATEMENT OF THE CASE

In Case No. 466 a writ issued on petition of defendants below, Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation, asserting that the Ninth Circuit Court of Appeals erred in holding valid the two method claims of respondents' patent 1,930,987 granted October 17, 1933 to John T. Simmons for a "Method and Apparatus for Testing the Productivity of Formations Encountered in Wells". The question presented by defendants' petition is:

> **Are the method claims 8 and 18 of plaintiffs' patent 1,930,987 invalid?***

In Case No. 479 a writ issued on cross-petition by plaintiffs below, Erle P. Halliburton and Halliburton Oil Well Cementing Company, to review the questions of validity and infringement of the apparatus claims. As set forth in plaintiffs' cross-petition these questions are:

> **(1) Are apparatus claims 9 10, 11, 12, 13, 14, 15, 16, 17 and 19 of United States Letters Patent No. 1,930,987, valid?**
>
> **(2) Are such apparatus claims infringed by the accused device employed by the defendants, Honolulu Oil Corporation, Ltd., and M. O. Johnston Oil Field Service Corporation?**

---

*The reasons assigned by defendants for allowance of the writ are limited to that question (petition pp. 5-6). In the opening brief now filed on behalf of defendants attempt is made to assert an additional issue of non-infringement of the method claims. This is contrary to the rule of this Court which limits the review on certiorari to questions specifically brought forward by the petition for the writ (General Talking Pictures Corp. v. Western Electric Co., 304 U. S. 175, 177-8).

The conflict of decision in the two Courts of Appeals

The Ninth Circuit Court of Appeals held the method claims (8 and 18) valid and infringed and the apparatus claims (9-17 and 19) invalid because of anticipation by the patent to Franklin 263,330 of 1882 (I, 530 and 98 F. (2d) 436, 438-9). In the Fifth Circuit the method claims were held invalid for lack of invention over the Franklin patent in view of the disclosures of the later patents to Cox 1,347,534 of 1920 and Edwards 1,514,585 of 1924 (88 F. (2d) 272).* As to the apparatus claims it was held that while they might define "a simplifying improvement on which a combination patent may rest" yet it "is not a basic and pioneer invention" of such character as to be infringed by the accused testing tool of the defendants in that case (88 F. (2d) 272)—the same tool that is used by defendants in the instant case.

The decisions in the Patent Office and in the District Courts

The application for the Simmons patent was filed on February 10, 1926 (II, 1-26). A more complete description and additional claims were presented by an amendment filed March 25, 1926 (II, 29-47) accompanied by a supplemental oath of Simmons (II, 48).** While pending before the patent office the application was involved in numerous

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*The expression in the Opinion was "Especially after the disclosures of Cox . . . and Edwards . . . we do not think that recurrence for this new use to what is in substance the simple apparatus of Franklin ought to be the foundation for broad method claims such as are here put forth. We hold them, while perhaps not strictly anticipated, to involve no such invention as entitles to monopoly" (88 F. (2d) 270, 272).

**This was done within the period of six months allowed within which an application after filing "shall be completed and prepared for examination".

"Sec. 4894. (U. S. C.: title 35, sec. 37.) All applications for patents shall be completed and prepared for examination

(*Footnote continued on next page.*)

that is, that such a device could be set in a well containing drilling fluid while there was no circulation thereof long enough to make a test. It substituted a much better process than had hitherto been in use. The patentee discovered that a well could be safely tested by the lowering of a single string of pipe equipped with a valve packer and strainer and that it was not necessary to set the casing permanently and bail out the drilling fluid, or, if a test were attempted without permanently setting the casing that it was not necessary to provide an extra string of pipe for circulation of the drilling fluid. See, Pacific Contracting Co. v. Bingham C. C., 62 F. 281; Tarr v. Folsom, Fed. Cas. No. 13,756; Lawther v. Hamilton, 124 U. S. 1, 8 S. Ct. 342, 31 L. Ed. 325."

This conclusion that the method claims are valid was reached after the court had found in the Franklin device an anticipation of the apparatus claims of plaintiffs' patent. Judge Wilbur said (I, 530):

> "Although we hold that the Franklin device anticipates the combination claims of appellants' patent and could be used in carrying out the patented process, this holding does not negative invention as to the process claims in suit. The apparatus used in carrying out a process may be old and yet the process valid. Expanded Metal Co. v. Bradford, 214 U. S. 366, 29 S. Ct. 652, 53 L. Ed. 1034, 1040; Carnegie Steel Co. v. Cambria Iron Co., 185 U. S. 403, 22 S. Ct. 698, 46 L. Ed. 968."

The Issues as to the Apparatus Claims.

As to the *validity* of the apparatus claims 9 to 17 and 19, the primary question is whether they are anticipated by the apparatus disclosed in the Franklin patent. That was the conclusion reached by the Ninth Circuit Court of Appeals for the reasons set forth by Judge Wilbur in his opin-

ion. (98 F. (2d) 437-9; I, 526-30). Plaintiffs (cross-petitioners in case No. 479) have asked this Court to review that conclusion.

Plaintiffs' position is that the apparatus disclosed in the Franklin patent, which was admittedly not intended for Simmons' purpose, is not adapted to that purpose without significant change in the apparatus; that even a very slight change made in the Franklin apparatus is enough to give the changed apparatus the status of patentable invention if the change was foreign to Franklin's purpose and was dictated by the new purpose which Simmons had conceived.

As to *infringement* of the apparatus claims, the evidence is that the accused testing tool differs from the specific form of device described in the Simmons patent only in the mechanical structure of the valve mechanism. These details of form are matters of subordinate invention covered by claims 1 to 7 of Simmons' patent. The departure in the accused testing tool from these details does not destroy its identity with the generic combination defined in the apparatus claims 9 to 17 and 19 here charged to be infringed.

The Disclosure of Plaintiffs' Patent

The invention disclosed in the Simmons patent comprises a method and apparatus for testing the productivity of formations encountered in drilling oil and other deep wells. Natural oil occurs in geological strata, ordinarily called "formations", well below the surface of the earth. Since there is considerable variation in the productive capacity of different oil-bearing formations, some means of ascertaining the commercial productivity of the different layers of oil sand encountered during a drilling operation is highly desirable. In short, one of the drillers' major problems is to know when to stop further drilling and complete his well for production. In rotary drilling this problem

is accentuated, as the patent points out (II, 4; 1/9-37),* by the presence of the drilling fluid. The drilling fluid is a mud-laden fluid which may be artificially produced and introduced into the well (I, 301) or may be created by the action of the drill where the formations encountered are such as to make a mud fluid of the proper consistency (I, 489). The mud is pumped from the top of the well, passing down through the drill pipe and out at the bottom, and returning up through the annular space between the drill pipe and the walls of the hole, thereby maintaining a continuous circulation (I, 46, 154, 267). The function of the circulating mud is to support the walls of the hole and prevent cave-ins (I, 39, 46, 156, 267, 490), to plaster the walls of the hole and prevent the fluids in the formations penetrated from entering the well (I, 38, 156, 267, 301, 490), to remove any cuttings from the bit or cavings dislodged from the walls of the well (I, 46, 154, 267, 490), and finally to prevent the tools from sticking or "freezing" in the well (I, 156, 267). The pressure exerted by the weight of this drilling fluid is such as to prevent the flow of oil or gas into the well when an oil-bearing formation is uncovered and consequently prevents the operator from determining the presence of oil in such a formation by direct observation. However, the cuttings of the drill which are raised to the top of the well may be examined, or a sample of the formation material itself may be cored out by means of a core barrel and a study of these samples will give the operator some idea as to whether the formation being drilled contains oil. These crude tests cannot be relied on to demonstrate the *productivity* of a formation, but will enable the driller to determine whether or not a productivity test should be made (I, 154-5).

The patent after describing this use of drilling fluid by the rotary method and how it obscures any indication of

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*In referring to the patent in suit we shall adopt the shorthand method of indicating the page and line as in the text (1/7-32), meaning page 1, lines 7 to 32.

the productivity of formations penetrated by the drill, or even the existence of any "cognate fluid" such as oil, water or gas (II, 4; 1/23-32), describes the prior method of testing and its deficiencies as follows (1/33-74):*

"Under the present practice, when making such a test, it is necessary to remove the mud-laden fluid from the well bore until the hydraulic head of liquid within the well is sufficiently below the head of the cognate fluids in the formation in order to allow this latter fluid to enter the well bore. In order that this mud-laden fluid may be removed from the well bore without danger of the well caving in, it is the general practice to set a string or strings of casing in the well so that this string or strings of casing may support the wall of the well when the mud-laden fluid is withdrawn. The lower portion of at least the inside string of casing is perforated in order that the fluids from the formation may enter the casing after the removal of the mud-laden fluid. If a water sand has been encountered above the formation to be tested, it is necessary to run in a string of casing and cement or otherwise seal its bottom to the sides of the well bore at a point below the known water level, in order to protect the formation being tested from this upper water strata. This string of casing is then known as a water string. In testing a well, the hole below the bottom of this water string is then protected by another string set inside the water string.

"In case the test develops that the formation tested is barren or not commercially productive or contains water and it is therefore desired to deepen the hole, it is necessary to refill the hole with mud-laden fluid, to remove if possible the inner perforated string, and to resume drilling. The cemented water string, however,

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*This is the method of testing prior to the patented method which was characterized by Judge Wilbur as "both expensive and detrimental to the well" (98 F. (2d) 437; I, 525).

must be left in the hole, which not only entails the cost of this string but decreases the size of the hole which can be thereafter drilled. If the testing operation is repeated with the setting of successive water strings, the size of the hole may ultimately become too small for successful drilling operations and attempts to drill deeper must therefore be abandoned."*

The Method of Testing Disclosed in the Patent

Having described this standard but unsatisfactory method of testing, the patentee states (1/75-101) that his object is to provide a method and apparatus for testing formations penetrated by the drill "without the necessity of removing the mud-laden fluid from the well bore" (1/82-4) by "obtaining a sample of the cognate fluid in the formation to be tested without substantial contamination of such sample" (1/98-101) which "does not require the setting of a water string above the formation to be tested and thus permits the testing of a well without involving the cost of such water string" (1/88-91) and "does not entail decreasing the size of the well bore" (1/95-6).

Describing his new method more particularly, the patentee goes on to say that he establishes "an empty chamber or conduit in the well bore adjacent the formation to be tested without removing the mud-laden fluid from the well, and then permit[s] the cognate fluids of the formation to discharge into said empty chamber or conduit" (1/104-9). Preferably the empty chamber, which may be the hollow drill stem ordinarily used for drilling the well, extends from the formation tested to the top of the well. If the cognate fluids of the formation are under sufficient pressure, the well may commence producing through

*This description of the prior standard method of testing is fully confirmed by the record (I, 44; and defendants' witness Heitmeyer I, 375-6).

this conduit.* If not, a sample is taken by the procedure described in the specification and claimed in the method claims. The cognate fluids of the formation will flow, upon the opening of the valve, into the empty chamber or conduit. The operator then turns the flow pipe at the top of the well to close the valve and entrap whatever fluid (whether oil or salt-water or both) has entered the empty chamber. "Following the entrance of the cognate fluid into the empty conduit or chamber, the apparatus may be elevated to the top of the well with the entrapped fluid content. The conduit being closed, the mud-laden fluid in the well is prevented from entering the conduit and contaminating the sample or otherwise interfering with the testing process" (2/13-20). To relieve the cognate fluid from the hydraulic pressure of the drilling fluid, and so permit it to flow under its natural pressure into the sampling device, the invention "also preferably embodies a means by which the formation to be tested may be sealed off from the hydraulic pressure of the mud-laden fluid standing within the well during the testing operation", and "by which the hydraulic pressure of the mud-laden fluid in the well may be reimposed upon the formation after the completion of the testing operation" (2/21-9). And the inventor "also provides a method and apparatus by which a formation may be tested through the penetration of the lower end of the testing apparatus into a so-called 'rat-hole,'** or an extension of the well bore of

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*Defendants in their brief (pages 4 and 26-7) quite erroneously say that this represents the "preferred form" of Simmons' method. Of course, any well driller prefers to strike such a "gusher"; but Simmons' method is not used or claimed where no sample is entrapped and lifted to the surface in the test string.

**"In drilling a well it is customary to drill a small hole ahead of the regular sized hole in which the casing is to be set, for the purpose of exploring with this pilot hole, called a 'rat-hole,' the formations below there, coring and catching the cuttings" (Halliburton I, 38 and see I, 50 and 157).

reduced diameter, . . . leaving . . . . a seat above the formation to be tested" (2/33-9).

The Testing Tool
Disclosed in the Patent

The testing tool disclosed as an example of an instrument adapted to carry out the method, consists of two principal elements (1) an empty chamber or conduit which may be the usual hollow drill stem 23, suitable to "be lowered into a well bore and, when so lowered, provide an empty chamber adjacent the formation to be tested" (2/64-6) and (2) a testing head or tool, which "may be connected in the same manner as a bit to the drill stem and run into the hole in the same manner" (3/93-5), comprising a valve body 4 forming a rotatable valve "which is adapted to normally close such chamber or conduit 23 from communication with the mud-laden fluid within the well and adapted to be operated when the device has been lowered into position within the well hole to permit the cognate fluids of the formation to discharge into the empty chamber or conduit provided by the pipe 23" (2/73-80), and carrying (1) a packer 15 "for sealing off the formation to be tested from the pressure of the head of mud-laden fluid within the well bore" (2/82-4) and (2) an inlet member 12 below the packer and valve "through which the fluids from the formation to be tested may be permitted to discharge into the conduit or chamber formed by the casing or pipe 23 when the valve is operated as later described" (2/60-90), i. e., "manipulated as desired from the surface of the well to close or open the empty chamber or conduit provided by the pipe or casing 23" (3/25-9).

In the remainder of the specification (3/35-117) the patentee rehearses the manipulation of his testing tool to carry out his method, explaining that the device must be let down into the well with the valve closed to prevent the drilling fluid standing in the well from entering the pipe "as, of course, the entry of such fluid would interfere with

the purity of the sample sought", and would also "impose a hydraulic head upon the formation to be tested when the valve is opened and thus defeat the object of the testing method". He emphasizes (3/93-5) that "the valve and packer as constructed may be connected in the same manner as a bit to the drill stem and run into the hole in the same manner, making it possible within a very few minutes to gain the sample and pull it to the surface"; that (3/98-113) as soon as the packer, which "operates to remove the pressure of the mud-laden fluid in the well from the cognate fluids of the formation" is lifted from its seat to remove the testing tool from the well "the pressure of this mud-laden fluid is again immediately reimposed upon the formation, thus preventing further discharge of the fluids of such formation. In this manner the well is always under control and no danger of blowouts encountered",* and that (3/113-17) the conduit is closed during the withdrawal of the tool so that "the mud-laden fluid within the well cannot contaminate the sample or otherwise interfere with the testing operation".

The Claims in Issue

The method of testing thus disclosed is defined in the two method claims 8 and 18 which read as follows:

> "8. A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe

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*The nature and disastrous effect of a blow-out which may occur sometimes in testing a well which has a very high pressure in the sand being tested is described by petitioners' witnesses O'Neill at I, 167 and Heitmeyer at I, 375; and see Peckham's Report, II, 438, and Chamberlain II, 447.

is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid from the formation to enter the pipe, closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well."

"18. A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognant fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample."

The testing tools adapted to the carrying out of this testing method are defined in various forms of expression in the apparatus claims 9-17 and 19. It is sufficient to refer to claim 15 for example:

"15. Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe

below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe."

The Utility and Practicability of the Invention

It will be observed that when the operator has thus entrapped in the pipe and brought to the surface an uncontaminated sample of the cognate fluids (whether oil or salt-water or both) in the formation to be tested, he can ascertain from it the productivity of the formation. What the operator wants to know is not merely whether the formation bears oil or gas, which is ordinarily already known from an examination of the well cuttings or from the taking of a core, but how much oil or gas the well would produce, if finished at that point (I, 39, 47-8). The Simmons invention, by recovering an entrapped and uncontaminated sample of the fluids forced into the pipe under the natural pressure within the formation, when relieved of the hydraulic pressure of the drilling mud, enables the operator to learn how much oil will flow from a formation in any given time (I, 39, 42). This provides him with a measure of the possible production of the formation (sand) tested (patent 1/89-90), something entirely new in the art (I, 44). If the test is negative the drilling may be continued, and the loss incident to the useless setting and sealing off of a string of casing has been avoided.

The operation is extremely simple and highly practical. It requires only the time involved in lowering, by the accustomed procedure, the drill pipe 23 carrying the packer and the valve in place of the usual drill bit, taking the test and withdrawing the pipe. It permits the operator to take the sample within a very short time—15 or 20 minutes in common practice (I, 41).

Summary of Argument.

Plaintiffs' patent discloses an invention of unusual importance and merit. This invention is fully described and is claimed in the patent with sufficient breadth to include the defendants' alleged infringement. The case turns on whether, in the light of the prior art and particularly the Franklin patent of 1882, the patent is to be sustained and given the full effect intended for it by the patent office.

The primary features of the Simmons invention which are responsible for its commercial success and which distinguish it from the prior art are:

(1) *The test is made with a single string of pipe without removing the drilling fluid and without maintaining circulation of the drilling fluid.*

(2) *An entrapped and substantially uncontaminated sample is recovered, thereby giving a measure of the productivity of the formation tested.*

The discovery that this could be done and how to do it was entirely new. It is a result never before accomplished. The procedure of entrapping and withdrawing a substantially uncontaminated sample as Simmons conceived and developed it reduces to a very few minutes the time that the test pipe stands in the well and eliminates the need of leaving the pipe in the well during the time that would be required for pumping or bailing. Thus Simmons found a way to operate so quickly that the test could be made while the circulation of drilling fluid was suspended, and yet escape the danger of "freezing" the test tool in the hole. No one had ever foreseen this possibility, or any way of accomplishing it.

The method by which Simmons accomplished this new result consists of a series of steps in a related sequence and properly timed, as follows: (1) establish an empty chamber

or conduit in the well bore adjacent the formation to be tested by lowering a single empty string of pipe having a valved inlet and carrying a packer through the mud-laden drilling fluid standing in the well with the valve closed to adjacent the formation to be tested; (2) set a packer above the formation to temporarily seal off the hydraulic pressure of the drilling mud and permit the cognate fluids in the formation to move under pressure of the natural forces within the formation into the well hole; (3) open the valve long enough to permit the cognate fluids to flow into the empty chamber or conduit; (4) close the valve to entrap the sample and exclude contamination by the mud-laden fluid in the well; (5) release the packer to reimpose the pressure of the mud-laden fluid upon the formation to prevent blow-outs and (6) lift the entrapped and uncontaminated sample of the cognate fluids to the surface for examination. This testing procedure makes it possible "within a very few minutes to gain the sample and to pull it to the surface."

The Franklin patent 263,330 of 1882, which is defendants' main reliance, discloses no such method. It discloses a valve-casing and valve for permanent installation in the flow tube of a finished dry-cased well* to control and regulate production. Franklin neither considered nor solved Simmons' problem. He did not discover how to test the productivity of a well full of rotary drilling mud, or conceive of making a test so quickly as to permit interruption of the circulation of the drilling fluid and yet escape the danger of "freezing" the testing tool, for rotary drilling was unknown at the date of Franklin's patent; oil wells were drilled and produced dry. There is in the Franklin patent no suggestion of taking an entrapped sample. The series of steps followed by Franklin is antagonistic to the series of steps of the Simmons method. The two procedures differ at each step (see *post* pp. 25-6).

*A dry cased well is a well in which substantially all fluids other than the cognate fluids from the oil-bearing formation are excluded (see post p. 29).

interferences wherein the patentability of the invention over the prior art, including the Franklin, Cox and Edwards patents here relied upon, was fully contested The claims were allowed in the first instance by the primary examiner (II, 80). The invention was subsequently held patentable by the law examiner in deciding a motion to dissolve an interference (II, 195-202). It was again held patentable by the Board of Appeals in a second interference (II, 146-52). Immediately following the grant of the patent, suit for infringement was filed in the United States District Court for the Eastern District of Texas. The district court (Judge Randolph Bryant) held the patent valid over the same prior patents and infringed by the same method and apparatus used by defendants in this case (see letter to counsel II, 228-9; interlocutory decree II, 215-21 and findings printed as a supplement to this brief). Following the decision of Judge Bryant the instant case was tried before Judge Cosgrave in the Southern District of California. Judge Cosgrave disagreed with the patent office examiners, the Board of Appeals and Judge Bryant and held the patent invalid as to both the method and apparatus claims (I, 20 and 18 F. Supp. 58). Thereafter the decision of Judge Bryant upholding the patent was reversed by the Fifth Circuit Court of Appeals, in the decision already referred to (88 F. (2d) 270). The decision of Judge Cosgrave and the decision of the Fifth Circuit (written by Judge Sibley) adverse to the Simmons patent, were greatly influenced, to the prejudice of these plaintiffs, by the view which had been taken of the Franklin patent in a decision by Judge Hutcheson in a suit* on an

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(Footnote continued from previous page.)

within six months after the filing of the application, and in default thereof, . . . they shall be regarded as abandoned by the parties thereto, unless it be shown to the satisfaction of the Commissioner of Patents that such delay was unavoidable: . . . etc.,"

*Edwards v. Johnston Formation Testing Corp., 44 F. (2d) 607; aff'd C. C. A. 5, 56 F. (2d) 49.

earlier patent to Edwards (see I. 21, 22; 88 F. (2d) 271). At the time that suit was before the courts the Simmons patent had not issued. It was held in the patent office by interferences with Edwards and others. The present plaintiffs, owners of the Simmons patent, were not parties to that suit. Both parties to it had interests hostile to the Simmons patent, and all knowledge of Simmons and his invention was kept from the courts in that case (see *post* p. 57). After the reversal of Judge Bryant by the Fifth Circuit Court of Appeals the instant case was heard and decided by the Circuit Court of Appeals for the Ninth Circuit in conflict with the decision in the Fifth Circuit.

The issues are those of an ordinary patent case. The case presents no question of patent office practice or of the method by which the patent is being exploited. The patent in suit is the only patent upon the invention, no continuing or divisional application being involved, and plaintiffs are themselves engaged in the business of operating the invention throughout the oil fields of the United States and in foreign countries.

The Issue as to the Validity of the Method Claims.

The issue to be reviewed, as to the method claims, is found in the following quotation from the opinion of the Ninth Circuit Court of Appeals written by Judge Wilbur (98 F. (2d) 439-40; I. 531):

> "As we have stated, Simmons faced the problem of providing a method of testing an oil well without removing the hydrostatic pressure necessary for supporting the formation in place. He met this problem by providing a method operating so quickly that the suspension of the circulation of drilling fluid was not substantially greater than that frequently necessary in drilling operations. Franklin neither considered nor solved this problem.
>
> "This discovery constituted invention for it disclosed what had not been thought possible in the art,

substituted a much better process than had hitherto been in use." (I, 531, 98 F. (2d) 439-40).

5. He found that the process solved the problem in a manner that had not previously been thought possible (*post* pp. 42-51 and 53-4).

> "This discovery constituted invention for it disclosed what had not been thought possible in the art, that is, that such a device could be set in a well containing drilling fluid while there was no circulation thereof long enough to make a test." (I, 531, 98 F. (2d) 440).

While Judge Wilbur did not find it necessary in sustaining the method claims to rely upon the commercial success of Simmons' method, the evidence establishes that upon Simmons' successful demonstration of his method of testing rotary-drilled wells, his method was immediately adopted and is now in universal use throughout the oil-drilling industry.

We dispute, however, Judge Wilbur's factual finding that Franklin's device could be used in carrying out the Simmons process and, therefore, anticipates the combination claims of plaintiffs' patent. The evidence establishes that there existed in the prior art no testing tool capable of being employed to carry out Simmons' method.

The Franklin apparatus could not be adapted to Simmons' purpose without significant change dictated by the new purpose and manner of application which Simmons had conceived. The Cox device, which is the only testing apparatus of the prior art intended or adapted to entrap a sample, is very different from the Simmons testing tool, and is not an anticipation of the Simmons apparatus claims 9 to 17 and 19. Its complete failure establishes the essential importance of the differences between it and Simmons' successful tool. The Edwards testing tool differed still more from the Simmons tool, and was neither intended nor adapted to entrap a sample. The other testing tools of the prior art, all of which call for the removal of the cog-

nate fluids from the stratum to be tested by flowing, pumping or bailing as distinguished from the entrapment of a sample, emphasize the novelty of Simmons' testing tool and method (see *post* pp. 52-3).

Infringement by defendants' accused method and testing tool is established by comparison of defendants' interrogatory answers with the disclosure and claims of Simmons' patent (*post* pp. 61-5).*

ARGUMENT

The Disclosure of Franklin's Patent 263,330 of 1882

The Franklin patent is defendants' main reliance in their attack on Simmons' patent. It discloses (II, 349) a "Device for Controlling and Regulating the Flow of Oil-Wells". The invention "consists in providing a device which can be connected with the tubing of the well, either within or without the well, but preferably within at a point above the packer, which has within it a damper or valve, which can be opened or closed by turning the tubing part way around" (1/14-19). The device illustrated and described is a valve housing B′ enclosing a rotary valve between an upper casting C and a lower casting B. The valve structure may be installed in the flow pipe of a well whose flow is to be controlled and regulated by attaching the upper section of the well tubing to the casting C at A′ and the lower section of the well tubing to casting B (1/74-8). The patentee explains that his device is intended to replace two devices then in use for controlling and reg-

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*Defendants' assignments of error and points of argument, in so far as they are not covered by the statement of plaintiffs' position in the main body of the "Argument", are discussed (post pp. 67-75).

The points of law applicable to the facts outlined above are, for convenience, stated with supporting authorities at the end of the "Argument" (post p. 76).

ulating the flow of wells (1) a brittle disk which had commonly been placed in the tubing at one of the lower joints to close the tubing until the disk is broken, after the tubing is installed in the well, by dropping a weight upon it, and (2) the previously used automatic control valves which acted to temporarily close the tubing "for the purpose of allowing the gas to obtain a head, and then opening and allowing the well to flow copiously for a short time, so as to clear it of paraffine, and also to make a well with short pressure of gas obtain sufficient head to flow" (1/20-44). He points out that the brittle disk referred to was "of no service in keeping the tubing closed while drawing it, and, indeed, there is no device to my knowledge, except my own, which will close the tubing while it is being drawn" (1/32-5); and that the earlier flow-control valves were sometimes made so as to operate automatically and placed down in the well, and sometimes the result was obtained by a simple stop cock operated manually and placed on the flow pipe at the top of the well (1/43-7) and he says "My device has to be operated manually, but it may be placed deep in the well, and thereby obtain considerable advantage" and goes on to say that the automatic valve proved defective at times, "and the whole tubing must be drawn." or the automatic valve "may confine the gas too long by being too heavily weighted" (1/48-62), whereas his device, he says, "is free from all complications, being perfectly simple in its construction and operation" (1/63-5).

We find, therefore, in this Franklin patent a disclosure of the permanent installation at some point in the flow pipe of a flowing well of a rotary valve operable by turning the pipe part way around and having a double function (1) to prevent the upward flow through the pipe while the pipe is being installed in the well or while it is being drawn, and (2) to temporarily close the tubing for the purpose of allowing the gas to obtain a head, and then opening it to allow the well to flow copiously for a short time so as to clear it of paraffine, or to make a well of short pressure of gas obtain sufficient head to flow.

Franklin's disclosure does not anticipate Simmons' method.

It is clear that Judge Wilbur was not at fault when he held that (98 F. (2d) 436, 439; I, 530):

> "The Franklin device was to be used in a flowing oil well. Such a well, of course, contains no drilling fluid. Moreover, at the time of the Franklin patent, the rotary method of drilling was unknown. . . . . . The device was evidently intended to be permanently attached to the tubing of the well. There is no suggestion of the last step of the patented process in suit, that is, the taking of an entrapped sample from an incomplete well containing dril ng fluid."

Since rotary drilling (with its use of the hydrostatic pressure of the drilling mud to support the formation in place and otherwise facilitate the drilling operation) was not known in Franklin's day, it is clear that Franklin did not face the problem of testing an oil well without removing this hydrostatic pressure. It is equally clear that his procedure did not provide a method of testing which operated so quickly that the test could be made within a time not substantially greater than the period of suspension of drilling operations frequently necessary in rotary drilling; and that he did not disclose that a testing device could be set in a well containing drilling fluid while there was no circulation thereof long enough to make a test, or that a well could be safely tested by the lowering of a single string of pipe equipped with a valve, packer and strainer and that it was not necessary to set the casing permanently and bail out the drilling fluid (see Judge Wilbur's Opinion I, 531).

Judge Wilbur's findings that Simmons did face this problem and did make these discoveries, as expressed in his opinion (98 F. (2d) 439-40; I, 531 and *ante* pp. 5-6)

are not disputed by defendants in their brief.*

Thus it is evident that Judge Wilbur did not err in plaintiffs' favor in his fact findings with respect to the disclosure of Franklin's patent and its relation to Simmons' method. These facts cannot be, and are not by defendants, disputed in any significant item. The legal conclusion that the Franklin patent does not anticipate the Simmons' patent is amply supported by the decisions cited in Judge Wilbur's Opinion (I, 530-32).

It is plaintiffs' submission that on the facts thus established this Court should affirm the decision of the Ninth Circuit Court of Appeals upholding the validity of Simmons' method claims (see Law Items 1 and 2, *post* pp. 76-9).

We proceed to a more detailed examination of the facts established at the trial, with the further submission that such closer examination abundantly confirms the finding of patentable novelty in the Simmons method, and also discloses that the Ninth Circuit Court of Appeals erred in holding that the Franklin patent anticipates Simmons' apparatus claims 9-17 and 19.

The Franklin patent does not disclose a packer on the flow pipe in which the valve is installed. The only mention of a packer is at page 1, lines 16 and 17 where Franklin says that his valve can be connected with the tubing of the well "at a point above the packer". Defendants contend, and Judge Wilbur found, that in conjunction with the common knowledge of the prior art this

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***Defendants in their brief take the position that the Franklin apparatus could be used in carrying out Simmons' process (with which Judge Wilbur agreed), and that, contrary to Judge Wilbur's conclusion, its use in that manner did not involve invention, or for other and more technical reasons was not patentable. But defendants do not suggest that there is any evidence that before Simmons' invention any one ever did use the Franklin flow-control apparatus to test a rotary-drilled well, or any other kind of a well.**

statement imports a packer on the flow pipe closing off the upper part of the well to build up the gas pressure in the lower part and force the gas and oil up through the flow pipe, and on this ground it was held that the Franklin apparatus could be used in carrying out the Simmons process and anticipates the combination claims of plaintiffs' patent. We deny the validity of this conclusion and have brought it before this Court for review. For the purpose of our discussion of the method claims at this point we are, however, assuming the correctness of Judge Wilbur's conclusion that Franklin's apparatus could be used in carrying out the Simmons process. Even so, it is clear that as Judge Wilbur found, the Franklin disclosure does not anticipate Simmons' method.

The Sequence and Timing of the Steps of Franklin's Procedure and Simmons' Method are Antagonistic.

In the first place the validity of the method claims is confirmed by direct comparison of the sequence and timing of the steps involved in Franklin's intended use of his flow-controlling apparatus with the steps of Simmons' testing method. That comparison shows that the series of steps involved in Franklin's intended use of his apparatus is antagonistic to the series of steps (see *ante* pp. 16-17) by which Simmons controlled and applied the natural forces within the formation to be tested to entrap and remove an uncontaminated sample of the cognate fluids quickly enough to escape the danger of "freezing" his testing tool in the hole, when the test was made through the uncirculated drilling fluid standing in the well.

Thus (1) Franklin's procedure contains no idea of establishing an empty sample chamber for only a few minutes within the well bore adjacent the formation to be tested. On the contrary, his is a permanent installation for a flowing well which does not call for or contemplate the sample chamber with its valve and packer adjacent the formation to be tested. (2) Even if a packer on the flow pipe is found to be

part of the Franklin disclosure (which we deny—*post* pp. 29-31) it is not used to shut off the pressure of any drilling fluid standing in the well thereby freeing the natural pressure on the cognate fluids within the formation. On the contrary, its function is to build up the gas pressure above the cognate fluids for the purpose of causing them to flow up the flow pipe and out of the well (*post* pp. 30-31). (3) In Franklin the valve is not open for only a few minutes, long enough to permit the cognate fluids to move into a sample chamber. On the contrary, it is kept closed for long periods of time to permit the gas pressure to build up in the well and then opened to permit the continuous flow of the oil up the flow pipe out of the well. It is clear that this procedure of bringing oil to the surface if carried out in a well containing a column of quiescent mud would necessarily result in cave-ins which would "freeze" the pipe and destroy the well. (4) The Franklin valve is not closed to entrap a sample and exclude the mud-laden fluid from the well as the sample is withdrawn. On the contrary, Franklin's valve structure is such (see *post* pp. 34-6) that while it will close the flow pipe against the *upward* pressure of the gas in the well during the insertion and withdrawal of the flow pipe, it is not capable of entrapping and holding a sample when the flow pipe is withdrawn. (5) Franklin had no idea of reimposing the pressure of the mud-laden fluid upon the formation to prevent blow-outs. (6) There is in Franklin no idea of entrapping and raising to the surface for examination an uncontaminated sample of the cognate fluids in the formation to be tested.

Thus as compared with Franklin, Simmons discloses a new series of operations constituting a new method or mode of application of known forces to produce a new result. The result was one never before produced, and it involved the wholly new discovery that a sample of the cognate fluids in a formation penetrated during the rotary drilling of a deep well could be recovered without removing or circulating the drilling fluid standing in the well. We confidently submit that no decision of this Court can

be found that denies patentability to such an innovation (Cf. Law Item No. 1—*post* p. 76).

The foregoing discussion has been predicated on the assumption that the Ninth Circuit Court of Appeals was correct in its conclusion that Franklin's apparatus could be used to carry out the Simmons process, as set forth by Judge Wilbur in the court's opinion (I, 526-30). We now proceed to a closer comparison of the Franklin apparatus with the Simmons testing tool, from which it will appear that the court's conclusion in this regard was unsound and that Judge Wilbur was at fault in the factual details upon which that conclusion is predicated.

Franklin's Apparatus Is Not Adapted to Carry Out Simmons' Method.

The essential features of Simmons' testing tool not found in Franklin's patent are (1) a packer so related to the inlet that it may seal off the formation to be tested from the hydraulic pressure of the mud-laden fluid standing within the well during the testing operation, and (2) a valve so positioned with respect to the packer and inlet that when closed it will entrap the entire flow of cognate fluids resulting from the natural pressure in the formation thus relieved from the pressure of the drilling fluid, and (3) so constructed that it will hold and bring to the surface the uncontaminated and undiminished sample.

As we have already mentioned, defendants argue and Judge Wilbur found, that the deficiency may be made up by reference to the general knowledge of the art at the date of Franklin's patent.

The Art of Drilling Wells As It Existed in 1882.

At the date of Franklin's patent, 1882, the modern deep rotary drilled wells were unknown (I, 365). The wells, being comparatively shallow, were drilled by lifting and

dropping a heavy drill bit and "jar" on the end of a cable (see II, 433; 436; 421; 424 and Plate XXXIX, II, 428) without the circulation of any drilling fluid in the well. The very early wells of 1861 (Carll Report of 1877, II, 429, Fig. 1) were drilled and produced "wet" without removing any water that might flow into the well from water-bearing formations above the oil sand. When the well was equipped with a flow pipe for production a seed-bag packer was mounted *on the flow pipe* at the base of the water-bearing formation to shut off the column of water standing in the well from the oil sand (II, 415-17). It shortly appeared, however, that the practice of leaving a column of water in the well was extremely dangerous since whenever the flow pipe and packer were removed for any reason the column of water would force itself into the oil sand and drive the oil away. The practice "finally brought ruin not only on the well itself but on others in the vicinity" (II, 409-10). To relieve this condition in 1868 a new method of operating producing wells was developed (II, 429, Fig. 2). The well was still drilled wet but when an oil sand was encountered the operator, before installing the flow pipe, first lined the well-hole with a small tubular casing extending down the well to a point below the lowermost water-bearing stratum. At this point a seed-bag packer or patent water-packer was affixed *around the lower end of the casing* and pressed against the wall of the well thereby shutting off the water above it and holding it trapped between the outer wall of the casing and the walls of the well, away from the oil sand. An air-tight casing head was then affixed to the top of the casing and the flow pipe introduced by an opening in the casing head and lowered down to the bottom of the well. The water standing in the well was then bailed or pumped out and the oil pumped or flowed through the flow pipe (II, 417-20).

A further innovation appeared shortly thereafter. The well of 1878 (II, 429, Fig. 3) was drilled to a point below the water-bearing stratum. The drill was then withdrawn and a relatively large casing introduced into the hole to

line the well. A collar was fitted to the bottom of this casing and the walls of the well were narrowed slightly at this point so that a water-tight joint between the bottom of the casing and the walls of the hole was obtained. The water standing in the well was exhausted by bailing, and drilling was continued in a "dry hole" until the oil-bearing sands were reached (II, 399 and 420-1). By this method the oil-bearing formation was protected even during the drilling operation from the injurious effect of water and the presence of a vein of oil became apparent the moment it had been reached. The advantage of this procedure was so great that, as the Carll Report states:

> "As wells are now drilled, a contractor is not allowed to continue his work unless he succeeds in effectually shutting off all water before striking the oil rock" (II, 421).

At about this date, according to the Carll Report, the use of a water-packer in connection with dry-cased wells came into vogue. This water-packer was mounted *on the flow pipe* when the well was prepared for production. It served "either to confine the oil and gas and induce them to flow, or simply to prevent the seepings of salt water which sometimes come in below the casing in quantities so small as to be scarcely noticed while drilling, from reaching the bottom of the well, to the detriment of its oil-production" (II, 422-3; 424-5). The Peckham Report contains an illustration of such a packer installed in a dry-cased well equipped with a casing head (II, 440, Fig. 4).

The Location of the Packer Referred to in Franklin's Patent.

From this review of the art prior to Franklin's patent it will be seen that in wells of that date packers were used on the lower end of the well casing, and they were also used in some instances on the flow pipe when the well was prepared for production. The only disclosure in Frank-

The patents to Cox (1,347,534 of 1920) and to Edwards (1,514,585 of 1924) on which defendants also rely do not disclose or suggest the Simmons invention. On the contrary, they represent prior unsuccessful attempts of others to test a formation encountered in rotary drilling without setting a casing and removing the drilling mud. These testing devices were predicated on the knowledge gained from experience that circulation of the drilling mud cannot be interrupted without the threat of damage to the well due to cave-ins and the danger of "freezing" tools in the hole against removal. Because of this the rotary drilling testing methods disclosed by Cox and Edwards provided for maintaining the circulation of the drilling mud, and for this purpose required the operation of two strings of pipe in the well, one inside of the other, the outer one to maintain the circulation of the mud and the inner one to make the test. The difficulties inherent in such a proceeding combined with other specific defects in the testing methods and apparatus proposed, were so great that the art preferred to stick to the old method of casing and removing the drilling fluid despite its serious disadvantages. The record discloses that these prior attempts had no practical use.. The failure of these attempts emphasizes the novelty and inventive character of Simmons' work.

The record fully supports the findings of fact upon which Judge Wilbur predicated his decision sustaining the validity of the method claims. The facts found by Judge Wilbur are of a character which this Court has always considered as establishing the existence of a patentable invention (see Law Items 1, 2, 3 and 4, *post* pp. 76-80). They are as follows:

1. He found that the process of the patent in suit was novel and had not been described or suggested by Franklin; that Franklin had neither considered nor solved the problem met by the process of the patent in suit (*post* pp. 21-25):

"The Franklin device was to be used in a flowing oil well. Such a well, of course, contains no drilling fluid. Moreover at the time of the Franklin patent, the rotary method of drilling was unknown. * * * There is no suggestion of the last step of the patented process in suit, that is, the taking of an entrapped sample from an incomplete well containing drilling fluid." (I. 530-31; 98 F. (2d) 439).

"Franklin neither considered nor solved this problem." (I, 531; 98 F. (2d) 440).

2. He found that prior methods of testing rotary drilled wells were unsatisfactory and expensive (*ante* pp. 9-10; *post* pp. 54-6).

"Prior to the patented method in suit tests were made by cementing a casing in the well and emptying the well of the drilling fluids by bailing and swabbing. * * * This method of testing was both expensive and detrimental to the well * * *." (I. 525; 98 F. (2d) 437).

3. He found that earlier inventors had attempted to solve the problem and had failed (*post* pp. 42-51).

"Earlier inventors had approached the problem with this thought in view and had provided two strings of pipe, an outer string and an inner string. (Patent 1,347,534, granted E. H. Cox, July 27, 1920; patent 1,514,585, granted C. R. Edwards, November 4, 1924). * * * The evidence shows that the use of two strings of pipe as disclosed by these patents was not practical." (I. 525-6, 98 F. (2d) 437).

4. He found that the process of the patent in suit solved this problem (*ante*, pp. 9-10 and 15; *post* pp. 53-6).

"He met this problem by providing a method operating so quickly that the suspension of the circulation of drilling fluid was not substantially greater than that frequently necessary in drilling operations. * * * It

lin's patent as to the use of a packer is in the statement that Franklin's new valve casing is connected with the well tubing preferably within the well "at a point above the packer" (II, 349, lines 12-17). This remark, even when illuminated by reference to the knowledge of the art, does not disclose whether Franklin referred to the packer at the lower end of the well *casing* (see Halliburton I, 453-4, and illustration II, 231) or to a packer mounted on the *flow pipe* when the well was prepared for production (see illustration facing p. 25 of defts.' brief).

Defendants insist, however, that Franklin must have been referring to a packer mounted on the flow pipe, as distinguished from one mounted on the well casing. They say that this is true for two reasons (1) that Franklin intended his device to be used "for the purpose of allowing the gas to obtain a head" (I 38-9) and that the gas could obtain a head *only if a packer on the flow pipe is used*, and (2) that unless the packer were mounted on the tubing to hold the lower portion of the valve against rotation the valve could never be opened. The first of these two arguments was accepted by Judge Cosgrave (I, 21) and by Judge Wilbur (I, 527). Neither Judge mentioned the second one.

Without waiving our submission that, as matter of law, a disclosure so uncertain is not enough to anticipate (*post* p. 31), plaintiffs submit the following factual considerations which are clearly established by the evidence at the trial, and which were either overlooked or improperly put aside by Judge Cosgrave and by Judge Wilbur:

1—The evidence is that dry-cased wells could be and were so constructed with tight casing heads that gas pressure would build up in them, when the flow was shut off as by Franklin's control valve, without any packer on the flow pipe. The Koch patent discloses such a well with a packer on the casing but no packer on the flow pipe, the casing having an air-tight casing head "which will prevent any escape of gas in that direction" (II, 341, column 2) and the use of such tight casing heads was common practice (see Carll's

Report, II, 419, 429, Figs. 2 and 3; Peckham's Report, II, 435-6, 440, Figs. 2 and 3) and still is (I, 483-4). It is therefore clear, and undisputed, that the gas could build up in a dry-cased well without any supplemental packer on the flow pipe. Judge Wilbur rejected this idea on the ground that "it finds no support in the language of the patent" (I, 529). But we submit that in the language of the patent one interpretation finds as much support as the other. Judge Wilbur went on to advance other considerations that made him think that Franklin had not contemplated using his device without a packer on the flow pipe (I, 529). We do not find in the record or in defendants' brief any support for these suggestions.

2—On the second point, as on the first, the evidence is contrary to defendants' contention. The evidence is that merely lowering the flow pipe until it rests on the bottom of the well would anchor the lower valve portion against rotation (see Latham's patent, II, 321, top of second column).

No conclusive argument can be drawn from the prior art or from the patent in favor of either theory and speculation must be substituted for proof. It is equally open to either interpretation and on this point alone plaintiffs submit that the Franklin patent must be discarded as an anticipation of the apparatus claims of Simmons' patent and is seen to be of even less pertinence to the method claims than Judge Wilbur believed. It is a well settled rule that a prior art patent which supports equally well two conflicting theories is too indefinite to anticipate (Law Item No. 5, *post* p. 80).

Franklin's Apparatus, Even as Defendants Interpret It, Is Insufficient for Simmons' Purpose in Four Vital Respects.

However, even assuming that the packer so indefinitely referred to by Franklin meant, to a man skilled in the art, a packer on the flow pipe, still the apparatus disclosed

in Franklin's patent is not capable of carrying out Simmons' method and is insufficient to anticipate the apparatus claims of Simmons' patent.

To illustrate their understanding of the Franklin disclosure, with a packer mounted on the flow pipe in accordance with their contentions as to the knowledge of the prior art, defendants have taken Figure 4 of the Peckham Report (II, 440) and added the Franklin valve to it at the place illustrated in the modified Figure 4 printed opposite page 25 of their brief. It will be observed that Franklin's valve, as defendants have inserted it in the flow pipe of this dry-cased well of 1880, is now associated with a packer, yet the assembly still does not correspond to the Simmons tool. It falls short of Simmons' tool in four respects.

1. A test cannot be made in accordance with the Simmons invention unless the position of the packer on the pipe be such that when the inlet to the pipe is adjacent the formation to be tested the packer will engage the well at the point required to seal off the formation from the pressure of the drilling fluid. Since the function of the packer is to relieve the formation of the drilling fluid above it during the brief test period, and to reapply the pressure of the drilling fluid immediately thereafter, the packer must be set *close above the formation to be tested.* But in the drawing of the well of 1880 relied upon by defendants the pipe is broken away between the packer and the inlet at the bottom of the pipe to indicate that the packer is at some indeterminate but substantial distance up the well. This is appropriate to the purpose of the Franklin arrangement (if it is assumed, as defendants contend, that the packer referred to by Franklin is a water-packer on the flow pipe) since the function of the water-packer in this flowing well of 1880 is primarily to build up a gas pressure in the well upon the oil to force the oil up the flow pipe to the top of the well. For Franklin's purpose the proper position of the packer is *above the surface of the oil* as it rises in the well under its own natural pressure, regard-

less of the depth at which the oil formation is located and even though a very considerable length of flow pipe, different in different wells, must be let down into the oil below the packer.

2. To carry out the steps of Simmons' method the valve must be mounted *close above the inlet.* The object of the productivity test is not merely to ascertain the existence of oil or its quality but to determine the amount of oil which the formation tested is capable of producing and whether it contains oil in commercial quantities (I, 42 and 48). When the packer is seated and the valve opened the oil (and salt-water if there is any in the formation) will pour into the pipe. The valve is left open for a known period of time, ordinarily from 15 to 20 minutes, and the valve then closed and the pipe withdrawn. By the height to which the liquid has risen in the pipe and by its composition the amount of oil which the formation will produce can be determined (I, 41-2). It is evident that if the valve is positioned any substantial distance above the inlet which is adjacent the formation, the valve when closed will retain above it only a portion of the oil produced, the test will be deceptive and no accurate determination of the formation's productivity will be possible. In an extreme case, the oil might not rise above the valve at all, the pipe would be withdrawn and the operator misled into believing he had encountered a dry formation. In any case the sample would not afford a measure of the possible production of the stratum tested (patent 3/89-90).

Defendants, for the purpose of building up an apparent similarity to the Simmons testing tool, have in their drawing opposite page 25 of their brief placed the Franklin valve immediately above the packer, i. e. as close to the inlet as possible; but there is no disclosure of that relationship in the Franklin patent and nothing in the purpose of the Franklin patent that calls for it. Franklin asserts that his valve "can be connected with the tubing of the well, *either within or without the well,* but preferably within *at*

a point above the packer . . ." (1/15-16). Franklin thus contemplates locating his valve at any point between the top of the well and the packer. He does assert that his device may be placed "deep within the well" and thereby obtain considerable advantage" (1/48-50), but "deep within the well" does not imply "at the bottom of the well", nor does "at a point above the packer" mean "just above the packer". The Simmons combination would be useless if the valve were located any substantial distance above the inlet which it is to control, as it is in Franklin.

From the foregoing it will be seen that even when the prior art imported into the Franklin patent is interpreted most favorably to defendants, it merely discloses the three major elements of the Simmons tool and fails to disclose the spaced relationship of these parts which characterizes the Simmons tool, and is required for the purpose of Simmons' method.

That Judge Wilbur failed to note or to take into account this deficiency may, perhaps, have been due to his preoccupation with the controversy between the parties as to whether it was proper to credit the Franklin disclosure with a packer mounted upon the flow pipe at all. In any case, he did overlook this deficiency of vital importance. It often happens that things of ancient date which have points of similarity with things of the present are assumed to be the same, the points of difference being obscured by distance; but upon closer scrutiny these points of difference are disclosed and the two things are seen to be quite unlike and by no means equivalent.

3. Another deficiency of the device disclosed in Franklin's patent that makes it unsuitable to carry out Simmons' method, and that differentiates it from the Simmons tool, is that in Franklin the valve is incapable of retaining and carrying to the surface an entrapped sample.

The Ninth Circuit Court of Appeals was, we believe, misled as to this by the fact that in the opening portion of the specification Franklin emphasizes that his device is capable

of "keeping the tubing closed while drawing it" (1/31-5), and the court assumed that ~~this meant~~ that he had a valve which would hold against leakage of any kind. But later in the specification it is made clear that his valve was preferably and intentionally made in the form of a check valve by giving a vertical play to the valve disk D. He says (2/13-15):

> "Between the shoulder b^2 and the flange b′ there is enough room to leave a very little play vertically to the parts lying between."

This play or vertical movement permitted in the part D is appropriate to the purpose of the Franklin patent; but it would defeat Simmons' purpose. Franklin did not want his apparatus, as it was withdrawn from the well, to lift oil out with it; he intentionally so designed his apparatus that this would not take place (I, 450-51, 456). As Franklin explains, the valve would keep the tubing closed against the upward flow of oil in the well while the flow pipe was being installed in the well and while it was being drawn,* because "when the device is closed the *pressure of gas* keeps [the disk D] seated on the part C above it, so there will be no leak" (2/19-21). It is only the upward pressure of the gas that keeps the tubing closed by the valve disk D when the upper section is "held in suspension" (2/17) as it must be when the flow pipe is being dropped down into the well or lifted out of it. But when, in drawing the flow pipe out of the well, it has been elevated to a point where the pressure of the fluid from below is no longer sufficient to hold up the weight of any fluid entrapped in the pipe, the disk D is free to drop downwardly and permit the escape of any such fluid, so that the apparatus will be withdrawn from the well empty.

That Franklin deliberately designed his apparatus so that the disk D would permit any oil in the pipe to escape back into the well is manifest from the drawings and speci-

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*". . . so that it could be brought out empty and not flow on the workmen while it is being withdrawn" (Halliburton I, 450).

fication of the Franklin patent and is corroborated by the testimony of the witnesses for both parties. (See Halliburton I, 466; 472; 481-2, and defendants' witness Howard who said: "According to this drawing in this patent fluid could not pass into the chamber above the valve, but it appears from this drawing that it could pass into the chamber below"—I, 370.)

(4) A still further insufficiency of the Franklin apparatus for Simmons' purpose is that if used in a well containing drilling fluid the device is open to the pressure of the drilling fluid above the packer, and this pressure would be carried down through the valve casing to the formation below the packer. For this reason the device could not possibly function as a tester. The path of this leakage would be into the valve housing B′ between it and the part C filling the chamber between them and then leaking around the flange c′ and the disk D into the lower pipe section B, and this leakage would occur especially if the valve had been opened (Halliburton I, 451-52; 465; 468). Such possibility of leakage would be no detriment to Franklin's purpose since his well contained no drilling mud or other foreign fluid; but for Simmons' purpose of taking a sample from the formation relieved of the drilling fluid pressure such leakage down the pipe into the formation below the packer would be fatal. Defendants' witness Howard admitted that if there was any appreciable clearance in the valve, such as is provided in the Franklin patent, the pressure of the drilling fluid would be rapidly imposed on the formation below the packer upon the valve being opened (I, 372) and that if there was any appreciable amount of leakage the test would be destroyed (I, 372). This further insufficiency of the Franklin apparatus for Simmons' purpose was overlooked by Judge Wilbur.

Thus a close examination of the mechanical combination of parts disclosed in Franklin's patent, even when supplemented by the general knowledge of the art as interpreted most favorably to defendants by defendants' counsel, discloses that, contrary to the conclusion arrived at by Judge

Wilbur, the Franklin apparatus could not be used in carrying out Simmons' process. This additionally confirms, we submit, the correctness of the decision of the Ninth Circuit Court of Appeals that Simmons' method claims are not anticipated by Franklin and also discloses that the Franklin installation is not an anticipation of Simmons' combination claims.

Franklin's Apparatus Does Not Anticipate Simmons' Combination Claims 9-17 and 19

From what has already been said, it is clear that in the Franklin patent there is no disclosure of the spaced relationship of the elements of the Simmons' testing tool, i. e., a packer so related to the inlet that it may seal off the formation to be tested from the hydraulic pressure of the mud-laden fluid standing within the well and a valve so positioned with respect to the packer and inlet that when closed it will entrap the entire flow of cognate fluids resulting from the natural pressure in the formation thus relieved from the pressure of the drilling fluid (*ante* pp. 32-4). This Judge Wilbur overlooked.

It also appears that as described in Franklin's patent his valve is deliberately so constructed that the disk D has freedom of movement to permit any oil in the pipe to escape back into the well, thereby making it incapable of carrying the entrapped sample to the surface for examination (*ante* pp. 34-6). Judge Wilbur in his opinion recognized this freedom of movement of the disk of Franklin's valve, and that it would permit the contents of the tube to escape as soon as the weight of the entrapped sample equals or exceeds the upward pressure of the gas (I, 529), but he put this deficiency aside, in his discussion of Simmons' apparatus claims 9 to 17 and 19, on the grounds (1) that "It is clear that no invention would be involved in tightening what otherwise would be a leaky valve"; (2) that while Franklin shows a valve disk having vertical play in his drawings and specifications, he "expressly

states that the lower disk may be secured to the lower part of the valve"; and (3) "Moreover, the Franklin device built tried and tested by the appellees recovered an entrapped sample" (I, 529-30).

No doubt, after Simmons' conception of the tool having a valve tight in both directions (which would not only shut out the upward pressure of the surrounding drilling fluid but would also hold the entrapped sample as the testing tool was lifted out of the drilling fluid) it was well within the ability of any competent mechanic to make for him such a tight valve; yet it is our submission that this is not enough to anticipate the Simmons apparatus claims 9-17 and 19.

It is to precisely such circumstances as these that this Court has repeatedly applied the rule that even slight changes, otherwise within the range of mechanical skill, are enough to give the changed apparatus the status of a patentable invention if the change was foreign to the earlier patentees' purpose and was dictated by the new purpose first disclosed in the patent in suit (Law Item No. 6, *post* pp. 81-2).

As to the statement that the lower disk may be secured to the lower part of the valve, found in the last paragraph of Franklin's patent (2/32-3), it is too obscure to constitute an anticipation, as we feel confident Judge Wilbur would have held if he had not misconstrued the importance of the fact that any competent mechanic knows how to tighten a leaky valve. As Mr. Halliburton pointed out, even though the disk D were attached solidly to the part B as Franklin suggests it would still leak, because at line 13 on page 2 Franklin says "Between the shoulder b^2 and the flange b^1 there is enough room to leave a very little play vertically to the parts lying between" (I, 469-70 and 488). There is no suggestion in the patent that this vertical play should be omitted if, as suggested at the end of the specification, the disk D is attached solidly to the part B. It is significant that in defendants' illustration facing page 28 of their brief, their definition of the "Alternate Form Described in Patent" violates Franklin's general

and unrestricted direction to provide room between shoulder b^2 and the flange b' "to leave a very little play vertically to the parts lying between" (II, 350, 1/13-15). The part lying between in the alternate form is the flange c' *but the defendants' drawing has eliminated the room for vertical play specified by the patentee.*

It is further significant that the Circuit Courts of Appeals are in disagreement as to the disclosure of Franklin in regard to his valve. The Ninth Circuit Court of Appeals has found that the alternative form of valve eliminating the floating disk was not intended to drain during withdrawal. The Court of Appeals of the Fifth Circuit, however, found the contrary, saying:

> "We agree however that Franklin did not intend to get a sample from the well by raising the pipe, but intended to keep from getting a sample that way by making his valve a leaking one that would let the contents escape as the pipe is raised" (*Johnston Formation Testing Corp.* v. *Halliburton*, 88 F. (2d) 270, 272).

The lower courts also reached conflicting conclusions as to Franklin's disclosure on this matter (I, 21 and Finding 30, appendix, p. 98). These flat disagreements appear to us to be in themselves strong evidence that Franklin's disclosure is too nebulous to anticipate the Simmons combination claims.

As to Judge Wilbur's finding that the "Franklin device built tried and tested by the appellees recovered an entrapped sample", plaintiffs' submission is that the evidence in that regard, based wholly upon *ex parte* operations attended by no representative of plaintiffs, is utterly insufficient. It is well settled that such *ex parte* tests have little weight; that they are subject to grave suspicion and every doubt should be resolved against them (Law Item No. 7, *post* p. 82).

Defendants produced a valve structure, defendants' Exhibit K, said to have been made in accordance with the Franklin patent and said to have been used success-

fully in one water shut-off test. "It is not the purpose of a water shut-off test to test the productivity of the formation" (Howard, I, 368). Defendants' patent expert Abbett testified to one attempt made with this Exhibit K which succeeded only in lifting out of the well a column of 260 feet of the drilling fluid "that had leaked around the packer and come up into the pipe" (I, 256-61; 260). Mr. Paul J. Howard testified about the water shut-off test (I, 517-19). He testified that they succeeded in drawing from the well in the drill pipe 150 feet of fluid "The top 100 feet of fluid consisted of gas and the oil-cut mud, and the bottom 50 feet consisted of mostly—there might have been a trace of mud in it—but mostly of fluid. We could see that it was practically all oil and oil-sand" and "On the basis of that showing I approved the test of shut-off, as indicating that no water had access to the hole from above the point of cementing the casing in the hole" (I, 368). On cross examination he testified that the valve did not leak but "Looking at the drawing [of the Franklin patent], the device itself is very similar to this drawing. I wouldn't say that it is made exactly as this is made. There is a difference possibly . . . in the size of the opening . . . According to this drawing in this patent fluid could not pass into the chamber above the valve, but it appears from this drawing that it could pass into the chamber below" (I, 370). That the valve of Exhibit K does not conform to the drawing of the Franklin patent is manifest, therefore, from the fact that in valve on Exhibit K the fluid did not "pass into the chamber below" and so leak away.

Defendants emphasize (their brief p. 31) testimony of the plaintiff Halliburton that "if the Franklin device were equipped with a packer and used to test the formation in accordance with the patent in suit, it would infringe the latter"; and Judge Wilbur was so far impressed by this argument that he expressly relied upon it in reaching his conclusion as to the invalidity of the apparatus claims (Opinion I, 529). But reference to the record will show that the question and answer *were excluded by the trial*

court and appear in the record only as evidence taken under the provisions of Equity Rule 46 (I, 491 and 210). Defendants took no steps to bring this excluded evidence properly before the Circuit Court of Appeals, and it seems clear that the exclusion of it by the trial court was correct. In any event the expression of Mr. Halliburton's opinion was conditioned by the words "If the Franklin device is so modified by the addition of a packer *and used in accordance with the teachings of the Simmons' patent,* I would say it was an infringement" (I, 491; emphasis ours).

Furthermore, as we have pointed out (*ante* p. 36), the Franklin valve housing, made up of the castings B′ and C, is so constructed that it could not be used for Simmons' purpose. For such use as Simmons conceived the valve casing would have to be tight against the inflow of the drilling mud that fills a rotary-driven well. Any competent mechanic could, no doubt, supply a tight valve casing when called upon to do so; but for Franklin's purpose there was no need for a tight casing. That need arose only after Simmons' conception of his new tool for testing rotary-driven wells without removing the drilling mud.

It thus appears that for these several reasons Franklin's apparatus could not be adapted to Simmons' process without significant changes foreign to Franklin's purpose but dictated by the new purpose which Simmons had conceived. On this state of facts it is clear, we submit, that the Ninth Circuit Court of Appeals erred in holding Simmons' apparatus claims invalid on the ground that "no invention would be involved in tightening what otherwise would be a leaky valve". That court further erred, we submit, in disregarding the spaced relationship of the elements of the Simmons combination, and in giving significant weight to the testimony as to the *ex parte* tests of the reconstructed Franklin valve, and in attaching importance to that portion of Mr. Halliburton's testimony that was excluded at the trial.

Because of these errors of law and fact in the decision of the Ninth Circuit Court of Appeals that the Simmons

combination claims 9 to 17 and 19 are anticipated by the disclosure of Franklin's patent, this Court should, we submit, reverse that decision and hold the combination claims valid.

The Unsuccessful Two-String Testers for Rotary Drilling Proposed by Cox and Edwards (Defendants' Assignments of Error Numbered 2 and 3)

Defendants bring to the attention of the Court the Cox patent 1,347,534 (application filed June 24, 1920) and the Edwards patent 1,514,585 (application filed January 17, 1921) in connection with their assignments of error numbered 2 and 3 (their brief p. 8). The asserted defense is that the method claims lack invention over the Franklin patent in view of the prior art; that they describe at most the use of the Franklin device in the manner proposed by Cox and Edwards (see defendants' brief pp. 8, 20 and 47).

Plaintiffs, on the other hand, rely upon the Cox and Edwards patents as *evidence that what Simmons did was invention.* These two patents show that men of inventive ingenuity skilled in the art, who are presumed as much as Simmons is to have had knowledge of Franklin's patent, approached the problem of testing a well drilled by the rotary method with the knowledge born of experience in rotary drilling that circulation of the drilling fluid could not be interrupted without grave danger of cave-ins above the packer and "freezing" of the drill stem in the well hole; and that because of that knowledge they believed that circulation of the drilling fluid had to be maintained. This belief that circulation was an indispensable step in the testing procedure constrained them to provide two strings of pipe, an outer string to maintain the circulation of the drilling fluid and an inner string to make the test. The result was that the testing procedure and apparatus they proposed was never used. The problem remained unsolved.

It is plaintiffs' submission that on the question of the inventive character of Simmons' work, these patents, so far from showing lack of invention, are the final and conclusive proof that Simmons' solution of the problem lay beyond the capacity of the men skilled in the art. They constitute that concrete evidence of invention which has always been recognized by this Court in the unsuccessful attempts of others to produce the same result. (Law Item No. 2, *post* pp. 77-9).

The Disclosure of the.
Cox patent 1,347,534.

In purpose and procedure the disclosure of the Cox patent approaches more nearly to Simmons' invention than anything else in the prior art. It is, indeed, the only disclosure of the prior art that proposes a testing device that will shut off the pressure of the drilling mud from the formation to be tested and then take a sample of any kind and bring it to the surface.

But by 1920 the hollow drill pipe had been dedicated to the supposedly indispensable function of a conduit for the circulating drilling mud, and Cox had no thought of dispensing with this circulation or of using the drill string as the sample chamber. Instead he proposed to assemble and run into the well, inside of the drill stem and concentric therewith, a second string of metallic hose to serve as a sample receptacle. Moreover the Cox arrangement did not provide for an uncontaminated sample. It used a check valve which permitted the drilling fluid to rush into the metallic hose as soon as the packer was lifted (I. 699).

The Cox patent (II, 367) discloses a testing apparatus for testing oil wells drilled by the rotary system "in order to ascertain if oil, water, gas and other liquids are under the path of the drill or in proximity thereto, that is the stratum

which has not been disturbed or only partially disturbed by the drill bit" (1/9-18). To this end the patentee provides "means for procuring and bringing to the surface a small quantity or sampling test of such oil, sand, water or whatever is in the path of the drill bit for inspection and analysis" (1/18-22). The testing head 3 threaded on to the lower end of the drill stem 1 is provided, as is usual in rotary drilling, with exit orifices 4 "to provide a passage for water, slush, etc., when the drill stem is lowered into the well" (1/63-4) whereby the usual continuous circulation of the drilling fluid to prevent the caving-in of the well is maintained (Abbett I, 317-9; 267 and Halliburton I, 490). The apparatus "for procuring and bringing to the surface a small quantity or sampling test of such oil, sand, water or whatever is in the path of the drill bit" comprises a second string of flexible metallic hose 13 within and concentric with the drill string, having its lower end screwed into the upper end of the body 6 of the testing head. The string of flexible metallic hose is thus in communication with a central bore in a nipple 9 extending downwardly from the body 6 which nipple carries at its lower end "a sharp pointed plunger 7 for piercing the formation at the bottom of the hole" (1/70-3). And this sharp-pointed plunger is perforated "so that liquid, gas, etc., may enter" (1/73-4). The nipple 9 is surrounded by a rubber nose 10. In operation "the drill stem carrying the device is lowered into the hole to within a short distance of the bottom where it is then dropped at sufficient speed to cause the nose 10 to forcibly strike the bottom of the hole. On such impact the sharp-pointed member 7 is forced downward and on breaking the closure 13a is plunged into the bottom of the hole. The impact of the heavy drill stem will also cause the rubber nose 10 to be forced against the walls of the well and effectually shut off the water and slush in the hole from the opening 14" (1/89-101) into the string of flexible metallic hose. Thereupon the desired small quantity or sampling test of the oil,

sand, water or other material in the path of the drill, passes through the perforations into the hollow interior of the sharp-pointed plunger "and flows upward and is held in the flexible hose 13 by a check valve 15 of any suitable construction. The drill stem may then be removed from the hole for inspection of the test" (1/104-8).

How the metal hose 13 proposed by Cox could be assembled within the pipe 1 as the testing device was let down into a deep well (which might be 5,000 to 10,000 feet deep) is not disclosed; but it is clear that this work of double assembly, however managed, would greatly delay the operation of getting the testing head down to the bottom of a deep well. There is no evidence to show or reason to believe that Cox's double-string tester could be assembled and gotten into the well within that relatively short period of time for which it is permissible, in rotary drilling, to interrupt the circulation of the drilling fluid. ~~It was Simmons' departure, by a bold step, from the two-~~string arrangement of Cox that made possible Simmons' use of the test string as the carrier for his testing head and as the receptacle for the test sample. This important advantage has been adopted in defendants' accused tool.

The "check valve * * * of any suitable construction" of the Cox patent, although capable of entrapping a sample is *not* capable of excluding the drilling fluid from the sample chamber as the drill stem is withdrawn. Consequently the drilling mud, during the withdrawal of the test string from the well hole, will rush into the metallic hose or sample receptacle containing the small sample captured when the plunger 7 pierces the formation at the bottom of the hole. Defendants' expert Abbett admits this (I, 312-314) and he agrees that this is a disadvantage as compared with a tester (such as Simmons') having a valve which will exclude the drilling fluid while the test string is being removed from the well; that a valve which will exclude the drilling fluid has the advantage "that the

quantity of material within the string will be identified as having completely entered the test string before the packer was raised from its seat" (I, 314). As Mr. Halliburton put it, the operator "never would know how much of the fluid within the tube came from the formation and how much was the mud fluid" (I, 459, f. 644, and see the testimony of defendants' witness Dear I, 398).

It is therefore apparent from a close examination of the Cox patent, and from what defendants are obliged to admit about it, that whatever Cox's purpose might have been, his apparatus was not capable of "complete separation of the water, mud, slush, etc., in the hole above the point from which the test is to be taken from the quantity to be investigated and analyzed" (1/23-7). The separation intended to be effected by the rubber nose 10 at the instant of stabbing the bottom of the hole, could not be maintained as the test string was withdrawn from the well. Indeed, the more carefully one reads the Cox patent the more his device appears to be incapable of doing any more, in the way of testing, than could be done by the old "sand pumps" by which scrapings mixed with the drilling fluid were taken from the bottom of a drill hole, without setting a packer to seal off the drilling fluid (see Carll patent 73,577 of 1868, II, 333; Carll Report of 1877, II, 412 and I, 237), except that Cox's stabbing device penetrated and so explored the stratum ahead of the drill "which has not been disturbed or only partially disturbed by the drill bit" (1/16-8). He proposed to make a "sampling test" not only of the oil and water but also of the sand "or whatever is in the path of the drill bit", and it was to test the stratum ahead of the drilling that he provided the sharp-pointed plunger 7 "for piercing the formation at the bottom of the hole" (see Abbett I, 316; Halliburton 499). At any rate, whatever his purpose may have been, it is admitted that Cox did not have a device such that the quantity of material within the test string could be idenified as having completely entered the test string before the packer was raised from its seat. Without such a sub-

stantially uncontaminated sample it is impossible, as Mr. Halliburton pointed out (I, 459), to measure the possible production from the formation tested.

It is clear, therefore, that Cox, although he had some elements of Simmons' idea, lacked the two primary features that gave success to Simmons; (1) the making of the test with a single string of pipe without maintaining the circulation of the drilling fluid, and (2) the taking of an entrapped and substantially uncontaminated sample that would give a measure of the productivity of the formation tested.

The Cox proposal was a complete failure. Although petitioners had their expert, Mr. Abbett, conduct a search to determine whether the Cox device was ever successfully used, they were unable to produce any proof that it was (I, 319), and they did not offer any proof that it was ever used at all.

Because the Cox tester lacked the two primary features of the Simmons tester, and because failure never anticipates success, the Cox disclosure is not an anticipation of either the method claims or the apparatus claims of the Simmons patent (see Law Item No. 8, *post* p. 82).

But defendants suggest (their brief, pp. 47 and 52) that when the Cox patent (or the Edwards patent) is taken together with Franklin's patent they show a state of the art from which Simmons' method and apparatus could be extracted without invention; i. e., by the exercise of the expected skill of well-drillers. There is, however, no evidence in the record that tends in the slightest degree to show that this was within the reach of the man skilled in the art. On the contrary, as we have already pointed out, the failure of Cox and Edwards, because of the complications and insufficiencies of their proposed testing apparatus, is convincing evidence that Simmons' simpler solution was not within the reach of well-drillers; and that evidence is further supported by the fact that the want which they tried to fulfill had existed unsatisfied for many years and

upon the advent of Simmons' invention it was completely satisfied by the universal adoption of his proposals. (See Law Item No. 2, *post* pp. 77-9).

Defendants in their argument finally assert (defts' brief pp. 49 and 52) that the Simmons process "is the same old process used by Cox," etc. But this evidently is not so. It is clear from the disclosure of Cox's patent that, as Judge Wilbur found, Cox rejected the idea of testing a well without circulation of the drilling fluid and consequently did not discover that the use of a single string of pipe for taking an entrapped sample was possible and practical (Opinion of Judge Wilbur I, 525-6). He did not disclose "what had not been thought possible in the art, i. e., that such a device could be set in a well containing drilling fluid while there was no circulation thereof long enough to make a test" or discover "that a well could be safely tested by the lowering of a single string of pipe equipped with a valve packer and strainer and that it was not necessary to * * * provide an extra string of pipe for the circulation of the drilling fluid" (Opinion, I, 531).

Edwards patent 1,514,585.

The Edwards patent discloses a two-string tester much like Cox's in general form and attached similarly to the drill stem, with a small pipe substituted for the metal hose of Cox. His disclosure is in the nature of a proposed improvement on the Cox device.* Edwards abandoned the idea of recovering an entrapped sample. As in Cox, the ordinary drill stem is used in the ordinary way to circulate the drilling fluid. The "water or slush is forced into the interior of the pipe by means of the ordinary slush pump commonly used for the purpose" (1/36-9). A packer of a more usual construction is substituted

*See Edwards v. Johnston etc. Corp., C. C. A. 5, 56 F. (2d) 49-50.

for Cox's unusual "rubber nose" (1/40-7). The second string of pipe within the drill pipe and by which the test is made is not assembled simultaneously with the assembling of the drill pipe as that pipe is run into the well, as in Cox. With the Edwards apparatus "When it is desired to make a test, the drill pipe with the nipple 4 and the perforated lower end attached to the packer is lowered to near the bottom of the well" (1/65-9) and only after that has been done is the test stem 8 inserted. This permits a washing water to be forced down the drill pipe in the space around the test stem 8 pushing the drilling mud ahead of it and "thoroughly washing the stratum to be tested", before the packer is set to isolate the stratum that is to be tested, and also permits the immediate setting up and the maintenance of the circulation of the drilling mud within the well after the packer is set (1/70-83). "After a time so as to let the water settle away and oil, gas or other fluid to accumulate" in the drilled well below the packer the lower end of the test stem 8 as shown in Fig. 7 is unscrewed from the sleeve 7 and the test stem is lowered. "If there be any pressure of oil, gas or other fluid it will now rush through the perforated section of the stem 8 and up the stem and if there be sufficient pressure of the oil, gas or other fluid from the stratum below the packer, it will push a stream of the same from the top of said stem" but ". . if the pressure of the oil, or other fluid should not be great" an ordinary pump is inserted "at any suitable point in the test stem 8" whereupon the pump "can be started and the fluid forced out through the stem 8 thus completely testing the stratum under investigation, both as to quality and quantity of flow of the fluid," (1/83-105).

There is no suggestion of entrapping a sample in the test stem or of withdrawing the stem with an entrapped sample. As said by the Board of Appeals in the patent office in distinguishing the Edwards patent from the Simmons' invention "The patent does not describe such operation of closing the valve and raising the pipe to remove

the entrapped sample" (II, 150). Defendants' expert concedes that "the whole disclosure" of Edwards "as far as description goes" was the idea of flowing the oil, gas, etc., out of the well through the tube (I, 324) either under its own pressure if that pressure is sufficient or, if not, then by pumping. The requirement that a pump should be used renders the Edwards patent totally impracticable for Simmons' purpose. Well pumps are not present at drilling wells and it would cost in the neighborhood of $2,500. to install such a pump for the purpose of making a test, as compared with a total charge of less than $300. for making a test with the Simmons' invention (I, 325).

Nor is the apparatus described in the Edwards patent *capable of* recovering an entrapped sample. After the lower end of the pipe 8 has once been unscrewed to let it down and expose the perforations in the lower portion of the pipe, it cannot be screwed up again to entrap a sample (I, 457) because it would not be possible to screw the end of pipe 8 back into the screw-threaded lower end of loose sleeve 7, which has nothing to hold it still (I, 547, Abbett 329-32).

In requiring the use of two strings and in failing to recover an entrapped sample, it is clear that the Edwards patent fails to disclose the essential features of the Simmons invention. As said by Judge Bryant before whom Edwards appeared and testified at the trial of the Texas case ". . . Edwards did not have in mind and did not disclose, and never did disclose, any such device as this man Simmons had." (Exh. 5, Texas, I, 803).

The Cox and Edwards patents emphasize the recognition of the problem and the difficulty of its solution, and prove that Simmons' solution was inventive.

These patents, apart from all the other evidence in the case, show that at least five years before the advent of Simmons' invention the need existed for a way to test the productivity of formations encountered during the rotary drilling of wells, without the necessity of per-

manently setting or cementing a string of casing, and those skilled in the oil drilling art recognized it as a problem to be overcome. The Cox and Edwards patents show unsuccessful attempts to solve that problem. Because the well might cave in and prevent the removal of the drilling apparatus, these prior inventors deemed it necessary to employ two strings of pipe and maintain circulation of the drilling fluid during the taking of a test, and neither of them discovered or conceived of any way of avoiding this. A two-string tester has never succeeded. The time required for running two strings into a well is prohibitive, as is also the time required for pumping out the oil, etc., from the formation undergoing test, as proposed by the later of the two, the Edwards patent. The art found it better to continue with the setting and cementing of casings rather than to make any use of the Cox or Edwards proposals. The uncontradicted testimony of respondent Halliburton establishes that the two-string testers have never succeeded and are nowhere in use today (I, 456-7).

By contrast with the Simmons patent, the Cox and Edwards patents show what was new and first discovered by Simmons. Neither the Cox patent nor the Edwards patent discloses the primary features responsible for the success of the Simmons invention. Both describe two-string testers and neither discloses the recovery of an entrapped and uncontaminated sample capable of measuring the productivity of a formation encountered in the drilling of a well.

This showing is very much emphasized, we submit, by the fact (see *post* pp. 57, 59 and 60-1) that both Edwards and Cox filed in the patent office, during the pendency of the Simmons patent application, interfering applications of their own of later date than Simmons' application (and, of course of much later date than their two-string tester patents which have been discussed) and in these later applications they disclosed single-string testers and made Simmons' claims, but were defeated in the patent office interferences (see Law Item No. 4, *post* p. 80).

Other Well Testers of the Prior Art Further Emphasize the Novelty of Simmons' Innovation.

The other patents and publications relating to the testing of formations encountered in the drilling of water wells and oil wells further emphasize the novelty of Simmons' invention. They all propose to remove the fluids from the stratum to be tested by flowing, pumping or bailing. No one of them proposes to test the formation by withdrawing an entrapped sample of the cognate fluids.

The Lyons patent 46,124 of 1865 (II, 318) shows an arrangement for testing oil wells in which, in case the formation tested will not discharge through the flow pipe under its own pressure, the fluid in the formation is driven to the surface "by forcing down a strong current of air" (patent p. 1, top of column 2; Abbett I, 230-31; and Defts' brief p. 26). It does not disclose the recovery of an entrapped sample (Abbett I, 349).

The Burr & Wakelee patent 68,350 of 1867 (II, 330, Abbett I, 235) shows an arrangement in which the fluid is drawn from the formation to be tested by pumping. That is the only way the patentees describe of getting any fluid out of the well (Abbett I, 350). Mr. Abbett agreed when questioned by the court that this was a material difference (I, 354).

Defendants' expert Abbett agrees that none of the publications of 1877 to 1885 Exhibits I-1 to I-3 describe the recovery of an entrapped sample, as distinguished from the recovery of cuttings etc. by a sand pump (I, 364 and see *ante* p. 46). The Carll Report of 1877 says (II, 421-2): "Thousands of dollars have been spent in testing hopelessly unproductive wells that were drilled 'wet', because it could not be known until they were tubed and tested, whether they contained oil or not." The Chamberlain Report published in 1885, discussing artesian water well drilling discloses a seed-bag or rubber packer on a flow pipe to test the capabilities of a formation to "yield

a flow at the surface when put under proper control" (II. 159-62; Abbett I, 228-30). Such a test is possible only when there is "sufficient pressure in the formation tested to cause the fluid to flow to the surface" (defts' brief p. 19).

Cooper's patent 1,000,583 of 1911 (II, 361) shows a very complicated arrangement by which "a well can be tested for the presence of oil or gas, by pumping" (II, 362, lines 117-18 and Abbett I, 263) or by bailing (Abbett I, 337).

Macready's patent 1,522,197 of 1925 (II, 393) shows a method of testing rotary driven wells containing the drilling fluid, in which the circulation of the drilling fluid is maintained by use of a double string as in Cox and Edwards, and fluid is removed from the formation to be tested by bailing (II, 394, line 70).

The Wide Industrial Use of the Simmons Invention

The Simmons invention has been universally adopted in substitution for the earlier practice of setting and cementing a string of casing. This is established by uncontradicted evidence.

A few days after filing his application for patent, Simmons demonstrated his invention in the lobby of the Garrett Hotel in El Dorado, Arkansas (I, 419). Word reached plaintiff [redacted] Halliburton in Oklahoma concerning this and he went to Arkansas, met Simmons, who demonstrated the tester to him, and on February 17, 1926 Halliburton entered into an agreement with Simmons for the rights to the invention (I, 34, f. 54; 45).

Initial Apprehensions of Well Owners

Simmons took his original device to Halliburton's headquarters at Duncan, Oklahoma, and Halliburton endeavored to get some well owner to let them operate the invention in a well. Simmons' proposal ran so far contrary to the knowledge and beliefs of well drillers that plaintiff Halliburton had difficulty in getting permission to run a test in any one's well because "no one thought that you could

leave the device in a well without circulating and not have it stick" (I. 45-6). An opportunity to demonstrate the invention was made possible only by respondent Halliburton personally guaranteeing the operator against loss or injury to the well, even to the extent of drilling a new well if necessary (I. 46). This emphasizes the novelty and inventive character of Simmons' work (Law Item No. 3, *post* p. 80).

Successful Demonstrations Under Halliburton's Guaranty

Contrary to the statement appearing in petitioners' brief (p. 14) the operation of the invention, employing the original Simmons device, was entirely successful from the beginning. The first demonstrations were made with the original Simmons device* upon three wells in Oklahoma belonging to Pace. Each demonstration was successful. The results of the first and third jobs were positive, showing the presence of gas in the formation tested. The result of the second job was negative, showing the absence of oil or gas (I. 420-1). Defendants' counsel assert in their brief (pp. 9 and 14) that the Simmons device was "a failure" and was "never commercially used"; but it is not denied that these demonstrations with the original tool led to its wide adoption, accompanied by improvements in structural detail. That the original device was inoperative cannot be asserted by defendants or their witnesses (see Gess, I. 394-5 and Dear, 406). Mr. Simmons testified: "I did do it and I can do it again" (I. 427, f. 600).

General Adoption

Having demonstrated the success of the invention with the original tool, the construction of testers for general use

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*The first original Simmons tester, corresponding exactly to the drawings of the patent in suit, was offered in evidence in this case as plaintiffs' Exhibit 9. A model corresponding thereto is plaintiffs' Exhibit 10.

was immediately undertaken. An improved form of valve with a stop-cock and gear was substituted for the original valve. The invention was then put into general use throughout the mid-continent oil fields and was introduced in California late in 1930 or early in 1931 (I, 115). Since 1927 the invention with this stop cock type of valve has been generally used throughout the oil industry (I, 63-4). Prior to the trial of this suit in the Fall of 1935 over 7500 wells had been tested with it (I, 63). In January or February, 1934 another form of valve, known as the "J" tool, was developed and put into concurrent use.*

The great value of the patented invention cannot be disputed. Once it had been established that a well could be tested with a single string of pipe without maintaining the circulation of the drilling fluid and with the recovery of an unimpaired sample from which the productivity of a formation encountered in drilling a well by the rotary method could be determined, the earlier method of testing rotary driven wells was discarded (Halliburton I, 63-4). Mr. Halliburton's testimony to this effect was nowhere denied. It is confirmed by defendants' witness O'Neill, secretary and treasurer of defendant Johnston Oil Field Service Corporation, in his statement of his qualifications to testify as an expert oil operator (I, 155); by the testimony on cross examination of defendants' witness Heitmeyer that up to 1930 the Standard Oil Company of California

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*We take exception to the statements at page 15 of petitioners' brief that "It is the 'J-Slot' form of testing tool, devised by Halliburton and not by Simmons, which attained some measure of success." The evidence is that the new testing method was practiced commercially with the stop cock and gear valve in the testing tool to the extent of approximately 3,000 tests in the years 1926 to 1933 inclusive (I, 61-2). The "J" tool device was developed in 1934 but of the 5,217 tests made from January 1, 1934 to the end of September, 1935 "Nearly all of those tests were made with the stop cock type device. A few of them were made with the 'J' tool device" (I, 63).

tested their wells by the old method of setting a casing and removing the drilling fluid from the well, with the resultant wasted expense and detriment to the well, but now uses the single-string formation tester instead (I, 375-6); and by the finding of Judge Bryant in the Texas case, that plaintiffs have developed a large business in this and foreign countries and its method and apparatus for testing formations in wells have "come into universal use and have become the standard apparatus and methods employed in testing the formations encountered in the drilling of oil wells throughout the oil-producing fields of the United States" (Finding 9, appendix *post* p. 92).

Judge Wilbur did not find it necessary to rely upon the commercial success of the Simmons testing procedure to sustain the patented method. His finding that Simmons' method was not anticipated by Franklin's patent for the reasons set forth in his opinion (I, 530-32), left no room for doubt that Simmons' innovation was invention.

If there were any doubt on this question of invention, the universal adoption by the industry of Simmons' method of testing would be sufficient to resolve that doubt (Law Item No. 2, *post* pp. 77-9). Such persuasive effect of the widespread success of the Simmons invention is not to be denied, as urged by defendants, because of the fact that immediately following successful demonstration with the original testing tool plaintiffs undertook the development of testers containing improvements in the form of the valve (Law Item No. 9, *post* pp. 82-3). The evidence clearly establishes that both the stop-cock and gear device (I, 53-4) and the "J" tool (I, 56-8) are used to perform the same series of method steps that characterize Simmons' method of testing, and that they differ from the testing tool disclosed in the Simmons patent only in the form of the valve, without affecting the substance of the device or destroying its identity with the Simmons invention.

The Effort of Edwards to Appropriate the Simmons Invention.

The two-string tester of Edwards' patent 1,514,585 was a complete failure (I, 456-7). Upon observing the widespread adoption and commercial success of the Simmons single string tester Edwards undertook to appropriate it. He first attempted this by claiming that the single string tester infringed his patent 1,514,585. The Simmons method of testing was introduced in Arkansas by plaintiff Halliburton in 1926. The Johnston Oil Field Service Corporation of Arkansas brought out in 1927 the Johnston tester (here involved) to compete with the Simmons tester. Edwards brought to trial in the Southern District of Texas before Judge Hutcheson in 1930 (44 F. (2d) 607) a suit against Johnston Formation Testing Corporation claiming that the use of the single-string Johnston tester infringed his two-string tester patent 1,514,585.

Both parties to that suit had knowledge of the Simmons application for patent then pending in the patent office. Johnston* had filed an application for a patent on defendants' single-string tester which application had been put into interference in the patent office, on October 5, 1927, with the Simmons application and other applications (II, 91-4). Edwards had filed an application for patent on the single-string tester and on January 30, 1930 this application had been put into interference in the patent office with the pending Simmons application (II, 113-20). This patent office situation including the fact that Simmons had filed his application for patent at an

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*Edgar Clinton Johnston, patentee of the single-string tester used by defendants in this suit and also in the suit by these plaintiffs against Johnston Formation Testing Corporation in the Fifth Circuit, of which the patentee Johnston is president (I, 415). See patent 1,709,940, application filed March 23, 1927, Serial No. 177,719 (II, 461).

earlier date than either the Johnston or the Edwards applications on single-string testers, was not revealed to Judge Hutcheson by either party at the trial of the Edwards suit against Johnston's company.* The case was decided by Judge Hutcheson without any knowledge of the Simmons invention or of its important contribution to the industry. When the case reached the Circuit Court of Appeals for the Fifth Circuit, that court likewise had no knowledge of the Simmons invention. Both courts held, nevertheless, that the Edwards patent 1,514,585 does not cover the single-string tester, thus defeating Edwards' attempt to appropriate the Simmons invention to himself under his two string-tester patent.**

On March 8, 1932 Edwards made a final attempt to enlarge his patent by filing a disclaimer in which he disclaimed any device not "capable of closing the test stem to the entrance of fluid from the bore beneath the packer by motion of the stem while the packer is set." (II, 390). By this means Edwards sought to appropriate the step of entrapping a quantitative sample which is fundamental in

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*Edwards v. Johnston etc. Corp. 44 F. (2d) 607, affirmed C. C. A. 5, 56 F. (2d) 49.

**Although this false light in which the single-string tester was first presented to the courts of the Fifth Circuit did not so far deceive those courts as to give Edwards success in his attempt to appropriate the Simmons invention, yet it should be noted that it was in this false light that the Fifth Circuit Court of Appeals first saw the single-string tester and was first asked to bring it within a patent monopoly. It is apparent from the opinion of Judge Cosgrave in the instant case (I. 21, 22) and from the opinion of the Fifth Circuit Court of Appeals in the suit on the Simmons patent (88 F. (2d) 270) that the conclusions reached and expressed by the Fifth Circuit Court of Appeals in that false light were prejudicial to these plaintiffs in the judicial consideration of the Franklin patent and its relation to the single-string tester described and claimed in the Simmons patent now at the bar of this Court (see ante p. 4, and remarks of court and counsel in the Texas case, Exh. 5, Texas I, 804-5).

the Simmons invention. Of course, this could not be accomplished by a disclaimer under the patent laws.*

After the unsuccessful outcome of his attempt to monopolize the Simmons invention under the Edwards two-string tester patent, Edwards continued to prosecute the interference of his later single-string tester application with Simmons in the patent office, asserting that he had conceived the invention as early as 1917 and that after some discouragement from one George Watkins "who pointed out the danger of the device becoming stuck in the well" (Exh. 5, Texas I, 155) he had disclosed the invention to Simmons in 1920. But on May 16, 1933 the patent office Board of Appeals decided the interference in Simmons' favor and awarded priority of invention to him (II, 153-69 and 170-6).

Finally when the suit for infringement of the Simmons patent came on for trial before Judge Bryant in 1935, Edwards appeared as a witness and attempted to assert that he and not Simmons was the inventor of the single-string tester, and that he had disclosed it to Simmons. Judge Bryant came to the same conclusion as the patent office, finding that the invention had not been communicated to Simmons by Edwards (see Finding 39, Appendix, *post* p. 102). At the end of the Texas trial Judge Bryant said:

> "* * * I think that the credible testimony, the record testimony, the record that was made of the transaction at the time, all this documentary evidence shows conclusively that this man Simmons was the inventor of that tester.
>
> "I do not think that there is any importance at all attached to his conversation with Edwards, whether he did or did not have it with him, because I consider that if he did have it with him, that Edwards did not have in mind and did not disclose, and never did disclose, any such device as this man Simmons had." (Exh. 5, Texas I, 803).

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*Altoona Publix Theatres v. American Tri-Ergon Corp., 294 U. S. 477, 55 S. Ct. 455.

At the trial on the Simmons patent before Judge Bryant in the Fifth Circuit the defendants E. C. Johnston and Johnston Formation Testing Corp. attempted to prove invention prior to Simmons by one Philp or his associate Carter. Defendants here in their brief (p. 17) refer to the comments of the Fifth Circuit Court of Appeals on this evidence and direct this Court's attention to it. Judge Bryant, who heard and saw the numerous witnesses who gave this testimony, at the conclusion of the case said: "I think everything in the testimony conclusively points to but one fact, and that is that this man Simmons conceived this idea, developed the idea and worked on it in conjunction with Henderson, and all the parties who made any claim of interest in it had actual knowledge of every step in the development and exhibition of the tool, the sale to Halliburton, the fact that Simmons returned to ElDorado and no claim was made by Carter during all the time he was there in business, when he is bound to have known Simmons sold the title to this patent. I have got my mind very firmly convinced that those are the facts." (Exh. 5, Texas I, 803).

The evidence was not offered by defendants in this case. It is apparent from Judge Sibley's opinion in the Fifth Circuit Court of Appeals, that in the use he made of this evidence there was a serious misapprehension of the law. The law requires that such a defense be established beyond a reasonable doubt (Law Item No. 10, *post* p. 83). Judge Sibley could not so find, being unwilling to go further than to hold that "the evidence is not clear" and leaves the matter in "grave doubt". Defendants can gain no advantage in this Court by referring to a defense found to be without merit in fact (by Judge Bryant), decided to be insufficiently proven (by the Fifth Circuit Court of Appeals) and abandoned (by defendants here) before the trial of this case.

Not only Edwards and Johnston, but also Cox, filed in the patent office a patent application disclosing a single-

string tester and claiming the Simmons invention. The Cox application was filed on February 4, 1927, the Johnston application on March 23, 1927 (II, 208) and the Edwards application on August 24, 1928 (II, 146). The other applications were all filed after the Johnston application in the year 1927 (II, 205-8); and there is evidence to show that all this activity was occasioned by the introduction of the Simmons invention by Halliburton in 1926 (I, 64, 65, 66-7).

Infringement

The infringement complained of is the manufacture and use by defendant M. O. Johnston Oil Field Service Corporation, and the use by defendant Honolulu Oil Corporation, Ltd. (complaint, par. 8, I, 5-6), of the accused testing method and testing tool described in defendants' interrogatory answers (I, 68-85; and see Halliburton I, 85-8 and drawings Exhs. 16-B, C and D, II, 225-7).

The Method Claims.

The Ninth Circuit Court of Appeals held the method claims 8 and 18 infringed for the reasons set forth by Judge Wilbur in his opinion (I, 532). Judge Bryant in the fifth circuit had held them valid and infringed (see Findings 24-5 and 28, appendix, *post* pp. 97-8). The Fifth Circuit Court of Appeals in reversing Judge Bryant as to their validity did not comment upon his findings as to infringement. No question of infringement of these claims if valid was brought forward in defendants' petition for certiorari, and under the rule applied in *General etc. Corp.* v. *Western etc. Co.*, 304 U. S. 175, 177-8 the question is not brought up by the writ.

Judge Wilbur's reasons for holding the method claims infringed (I, 532) leave no room for doubt.

As described in defendants' interrogatory answers, the apparatus illustrated in Exhibit 16-B (II, 225) is assem-

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bled with the packer in Fig. 3 screwed onto the bottom of the tester in Fig. 1. The method practiced by the defendants with this apparatus is as follows (see interrogatory answers, I, 84-5): The drill pipe 5, carrying the tester, is lowered down the well through the drilling fluid with the main valve 41 closed. When the apparatus has reached the bottom of the hole the packer is forced tightly into its seat to shut off the well below the packer from the pressure of the drilling fluid contained in the well above the packer. By lowering the drill pipe sufficient weight is imposed to open the main valve 41 permitting fluid to flow through the main valve and into the drill pipe 5. At the conclusion of the test, the drill pipe is lifted, drawing the main valve to a closed position followed by lifting the packer from its seat. The drill pipe carrying the tester and packer and containing the entrapped sample is then withdrawn from the well. The successive steps are identically the same as in the Simmons method (Halliburton I, 86-7 and Judge Wilbur's Opinion I, 532). The arguments in defendants' brief to the contrary (pp. 54-61) are contradicted by their answers to the interrogatories (I, 84-5). Infringement of the method claims by this series of steps is independent of any difference in the structural form of the apparatus used (Law Item No. 11, *post* p. 83).

The Apparatus Claims:

It is our submission that the apparatus claims 9 to 17 and 19 are also clearly infringed, since the defendants' accused testing tool is in every way the equivalent of the Simmons testing tool, differing therefrom only in the detailed structure of the valve and the mechanical means for opening and closing it.

Judge Bryant in the Texas case held these apparatus claims infringed by the Johnston tester employed by defendants in this case (Findings 14-23 and 27, Appendix, *post* pp. 93-7 and 98).

Defendants' contentions that the claims are not infringed are predicated upon the assertion that in view of the prior art "Simmons was not a pioneer inventor, nor indeed any other kind of an inventor" and that "if the Simmons patent is valid at all, it is merely an improvement, for which reason the claims should receive a narrow construction, and the patent limited to the precise device therein described" (their brief p. 55). If the claims are upheld on the grounds which we have set forth, and in accordance with the scope intended for them by the patent office, they are clearly infringed.

The identity that constitutes infringement in this case may conveniently be set forth by comparing defendants' accused testing tool with claim 15 of the Simmons patent, for example. The first element in claim 15 is:

> "a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested".

This is the pipe 5 on the drawing in Plaintiffs' Exhibit 16-B. Only one string of pipe is employed in appellees' tester.

The second element called for by claim 15 is:

> "a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested".

Appellees use at different times three different forms of packers corresponding to this element of claim 15. Figure 3 of Exhibit 16-B (II, 225) shows a "rat-hole" packer corresponding exactly to the packer illustrated in the Simmons patent. Figure 2 of Exhibit 16-C (II, 226) shows this packer seated in the well bore to seal off the formation from the drilling fluid above the packer. The packers shown in Figures 2 and 4 of Exhibit 16-B (II, 225) are known as "full hole packers"; but it is not suggested that the Simmons apparatus claims are restricted to any par-

ticular form of packer. These types of packers are used interchangeably by both plaintiffs and defendants. All three meet the specifications of claim 15 that the packer is "adapted to be positively pressed against the walls of the formation to seal off the same".

The next element of claim 15 is:

> "means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet".

The inlet below the packer is clearly shown by the part marked "Perforated Nipple 66" in Fig. 3, and by the part marked "Perforated Nipple" in Fig. 2 of Exhibit 16-B (II, 225). The valve structure for controlling the inlet, specified in claim 15, is the main valve 41 and the renewable seat 40.

The concluding element of claim 15 reads:

> "said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe".

The part marked "Renewable Seat 40" of the main valve of appellees' tester is rigidly connected with the packer, and the part of the main valve marked "Main Valve 41" is rigidly connected by mandrel 11, housing 7, and collar 6 to the drill pipe 5.

The application of the other apparatus claims in suit (9 to 14, 16, 17 and 19) to defendants' apparatus may be made in a similar manner. The valve composed of the main valve 41 and renewable seat 40 is the valve "positively controlled by movement of the pipe". This is conceded in defendants' interrogatory answers, where defendants state:

> "When the drill stem is lifted it will draw the main valve 41 to a closed position and will then lift the

> packer from its seat, thus allowing the drill string and the tool to be withdrawn from the well with an entrapped sample" (I, 85).

The fact that defendants add various auxiliary valves to their apparatus cannot vary the fact that defendants employ each of the elements of the apparatus claims and, as expressly held by Judge Wilbur (I, 532), does not avoid infringement. These auxiliary valves, the trip valve, the equalizing valve, and the circulating valve, are merely safety valves for an emergency. The trip valve is used only as a precaution in the event the main valve opens accidentally while being lowered into the well. After being tripped it performs no function in the testing of the well (I, 429). The circulating valve is used only in emergency and, if used, the test is abandoned (I, 202). The equalizing valve is merely a device to lessen the pull required to unseat the packer (I, 200), an old expedient commonly employed with packers (Exh. H-8; II, 244-6). The addition of these auxiliary valves does not avoid infringement. (Law Item No. 12, *post* p. 84).

Defendants in their brief misleadingly and unnecessarily introduce much confusion in their discussion of the fact that defendants accused single-string tester and plaintiffs' latest "J-slot" tool have an auxiliary valve on the testing string (drill string) so arranged that in an emergency arising during a test drilling mud may be forced down the test string and out at the bottom to reestablish circulation (see defts' brief pp. 6 and 67-8). Counsel say that defendants' accused tester, and plaintiffs' J-slot tool "actually provide for maintaining or reestablishing circulation, if deemed necessary by the operator" (p. 21). They fail to point out that circulation is not and cannot be maintained by these devices while the test is being taken; that when in an emergency the test string is used to reestablish the circulation it "spoils the test when we pump through it" (O'Neill I, 202 and see Abbett I, 318-9; Halliburton I, 501-2). This Court will understand, we believe, that when the single-string tester of Simmons' patent and

of defendants' use is thus equipped with this safety feature, and use is made of it in an emergency, the operator must for that operation sacrifice the use of the test string as a sample holder in accordance with the Simmons invention and revert to its use as a mud-circulating conduit—the use to which it was dedicated before Simmons' invention. It seems to us extravagant for defendants' counsel to suggest, as they do in their brief, that Simmons' invention in "the omission of both a casing and circulation, . . . really possesses no merit and has no use . . . conclusively showing that any thought Simmons may have had of dispensing entirely with circulation was impractical and was never commercially used either by himself or his successors in interest" (brief p. 67). It will be evident, we think, that the incorporation of this emergency safety device in plaintiffs' "J-slot" tool and in defendants' accused testing tool merely emphasizes the reality of the difficulties that confronted Simmons, and of the chances he took, when he devised a testing operation capable of being carried out so quickly that the test could be made during an interruption of the circulation of the drilling mud.

Defendants point to the fact that the main valve in their apparatus is operated by lowering and lifting the pipe, whereas the valve illustrated in the Simmons patent is operated by turning the pipe. The apparatus claims 9-17 and 19 here relied upon make no differentiation in this regard. They include either rotary or vertical movement of the pipe. There are other claims in the patent (claims 1-7) which are directed to the rotary valve construction, and under the familiar rule this limitation will not be read into the claims in which it is not expressed (Law Item 13, *post* p. 84).

Defendants in their argument assert (their brief p. 16) that defendants' accused device is "radically different from that of the patent in suit, and covered by its own patents" and consequently should be free from the charge of infringement. But the grant of an improvement patent

is no ground for declaring that the improvement is not an infringement of an earlier but broader patent (Law Item No. 14, *post* p. 84). The fact is, as we have already said (*ante* p. 57), that defendants are operating under the Johnston patent 1,709,940 during the prosecution of which Johnston sought for and obtained an interference with the application for the Simmons patent (II, 183; 190-4), thereby asserting that opening the valve by vertical movement of the pipe, as in defendants' accused device and in the Johnston patent application, is equivalent to opening it by turning the pipe as in Simmons.

The contention that respondent Honolulu Oil Corporation has not been shown to have employed the infringing method and apparatus but has merely employed respondent M. O. Johnston Oil Field Service Corporation, as an independent contractor to do so, is completely refuted by the record. The record shows that in the wells tested for Honolulu Oil Corporation the work was done jointly by Honolulu Oil Corporation and M. O. Johnston Oil Field Service, and that the latter was not a mere independent contractor for the former (I, 207-8; 386-7). This is a case of joint infringement. The Ninth Circuit Court of Appeals held: "We find that the Honolulu Oil Corporation participated jointly in infringement in using the process on the wells drilled by it" (I, 532).

Defendants' Assignments of Error and Points of Argument.

In defendants' brief the six assignments of error (p. 8) are developed in six points of argument summarized on the last half of page 10 and page 11. The defenses as thus stated are for the most part artificial and irrelevant to the facts of this case.

We state below our position with respect to these assignments of error numbered 1, 3, 4 and 5,* with our comments on some ancillary points made in defendants' brief.

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*Assignment of error No. 2 is covered by our discussion of Franklin's patent ante pp. 21-37; and assignment of error No. 6, as to infringement, is covered ante pp. 61-7.

Defendants' Assignment of Error No. 1.

Defendants assert that "The method claims merely describe the function of an apparatus, designed and intended for a particular use" (brief p. 8, 37-43) and refer to the well established rule of this Court "that the *mere* function or effect * * * of a machine can not be the subject matter of a lawful patent". *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366, 383 (emphasis ours). The emphasized word is important for this Court in that case immediately went on to say:

> "But it does not follow that a *method of doing a thing*, so clearly indicated that those skilled in the art can avail themselves of mechanism to carry it into operation, is not the subject matter of a valid patent. The contrary has been declared in decisions of this Court" (p. 383, emphasis ours). See also *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U. S. 403, 424.

It is not objectionable, therefore, that in carrying out the process, mechanism is required to be used: it is only where the process consists *merely* in the function or effect of the machine that the law denies protection to the process.

It is clear that the Simmons process is not the mere function or effect of the apparatus or tool used in carrying out the process, since without an ordered manipulation of this tool to perform the series of steps of the Simmons process, the process will not result. As Judge Wilbur found (I, 532) "The process in suit is not the function of a machine; it requires manual operation". The Simmons tool has no inherent law of operation which of itself leads inevitably to the performance of the steps of the process. The Simmons apparatus may be lowered into the well and yet nothing will happen until the apparatus is manipulated. Nor will arbitrary manipulation of this tool result in the performance of Simmons' method or in the attainment of his result. The tool may be inserted into the well with the valve open, the packer may be set elsewhere than "above the formation", the valve may be

opened before instead of "after the packer is set", or the valve may be left open while the tool is being withdrawn. Any such variation from the steps called for by Simmons' method claims would be a variation from the Simmons process and any such variation would prevent attainment of Simmons' result. It is only by performing the particular series of steps of the Simmons process in the order described that the new result of the patent is attained. Inspection of the Simmons apparatus would not have enabled a man skilled in the art to attain this new result. Further knowledge would have been needed, a knowledge of the series of steps in accordance with which Simmons intended his apparatus to be operated, in short, the Simmons method.

With regard to the words "designed and intended for a particular use" in their statement of the law just above referred to, defendants develop the extraordinary argument that the Simmons method is unpatentable because it is described in the Simmons patent in connection with a testing tool found by the Ninth Circuit Court of Appeals to be unpatentable as a tool (defts.' brief pp. 6 and 40-3). They assert in their brief (p. 6) that this case "comes here as one of first impression" because, they say, they have been unable to find any case in which a method claim was held valid where claims for a particular apparatus described in the same patent as a useful instrumentality for carrying out the method, had been held invalid. Even if no cases existed in which this situation was presented, it would nevertheless not be one of first impression in any real sense because it is fully covered by the well established rule of this Court, that "the apparatus used in carrying out a process may be old and yet the process valid." Nevertheless, since defendants have been unable to find them, we call the Court's attention to two cases which presented exactly this situation. *Naivette v. Bishinger*, (C. C. A. 6) 61 F. (2d) 433, 436 and *Cameron Septic Tank Co. v. Village of Saratoga Springs* (C. C. A. 2) 159 Fed. 453, 463, 464. In the *Naivette case* the Court said (61 F. (2d) 436)

"There is no contradiction in sustaining validity of a process, which includes clamping as a step in a new combination, and yet to deny validity to the patent for a clamp as a unitary device."

Defendants' Assignment of Error No. 3

Defendants assert that "The method claims describe, at most, only a different use for the old device disclosed in the Franklin patent, which different use is itself old." (brief pp. 8, 11 and 45-7). They say that the pronouncement has been made many times by this Court that "The new use of an old apparatus is not invention" (their brief, p. 45). This, however, is not an accurate statement of the law as pronounced by this Court. Thus stated, the rule would conflict with the other well established principle that "the apparatus may be old and yet the process valid" which defendants recognize (brief p. 43). A correct statement of the rule is given in the leading case of *Pennsylvania R. R.* v. *Locomotive Truck Co.*, 110 U. S. 490, 494, referred to by defendant, where this Court said:

> "the application of an old process or machine to a similar or analogous subject, with no change in the manner of application, and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not before been contemplated."

This rule assumes that the application is (1) of an *old* process or old machine; (2) to a similar or analogous subject; (3) *with no change in the manner of application;* and (4) *with no result substantially distinct in its nature.*

More specifically, defendants' contention is that "Simmons made no changes in structure over Franklin," and "is not entitled to a patent merely for suggesting the application of the old Franklin device to a new or different use" (their brief, p. 46). A reading of the cases cited by defendants in support of this proposition (their brief, pp. 45-6) will disclose that in every instance the fault found with the patent was that it consisted in the application of

an old instrumentality (process or machine) to a new subject *in the same manner* as had been customary in the past. The "new use" lay in applying the old instrumentality in the old manner to a different but analogous subject. There was no change in the manner of application and no result substantially distinct in its nature. In the instant case (if we assume for the sake of argument that the apparatus of Franklin's patent required no change to adapt it to Simmons' purpose) the Simmons process is nevertheless not an old but a new process. Its novelty lies in a particular series of manipulations which constitute a *new manner of applying* the old tool nowhere suggested by, and antagonistic to, Franklin's procedure (see *ante* pp. 16-17 and 25-6). It is this change in the manner of application that gives to the Simmons procedure a new result substantially distinct in its nature, and never contemplated by Franklin. This novel series of manipulations is the new Simmons process. The doctrine of "new use" advanced by defendants has no application to this situation and the cases cited by defendants are, therefore, not pertinent.

The suggestion repeated at this portion of defendants' brief (p. 47) that by taking the prior art patents relating to well testing devices together with Franklin's patent, Simmons' method could be arrived at without invention, has already been discussed (*ante* p. 47). It has nothing to do with the doctrine of "double use".

Defendants' Assignment of Error Number 4.

Defendants' fourth assignment of error is that the method claims "depend for their novelty upon mechanical limitations, expressly placed there to evade the prior art" (defts.' brief pp. 8, 47-52).

The answer to this proposition is that it is not factually correct. The method claims 8 and 18 do not "depend for their novelty upon mechanical limitations". The method claims, in their reference to apparatus, define not the apparatus itself but the *use of it* in Simmons' step-by-step procedure. The case is governed by those deci-

sions of this Court which have held valid novel methods which depend upon a defined use of mechanical instrumentalities (see *ante* pp. 68-9, and Law Item No. 15, *post* pp. 84-7).

We have already seen that a major distinction between the Simmons method and the procedures of Cox and Edwards lies in Simmons' conception of taking a sample "within a very few minutes" during a period of suspension of the circulation of the drilling mud, thereby emancipating the drill string from its supposedly indispensable function of a conduit for the circulating drilling mud, and making use of it as the sample chamber. Simmons undertook to express this novel idea, first conceived of by him and differentiating his method from what was previously known, in his patent claims. Defendants in their brief refer repeatedly, but somewhat indefinitely, to the fact that the Simmons claims were allowed after several rejections (their brief pp. 15, 20 and 48, for example). But examination of the file wrapper history (II, 10-110; see particularly pp. 60, 62-3, 66, 69, 76, 97, 99-100 and 102) will show that the applicant and the examiner, who recognized the patentability of the new idea, were endeavoring to find an appropriate expression for it in the method claims. The expression agreed upon was "a method of testing . . . *involving the insertion of only a single string of pipe into the well*" (claim 18), and ". . *lowering an empty string of pipe into the well*" (claim 8). These are thoroughly adequate expressions of method, under the decisions of this Court. We submit that the method claims are not open to defendants' attack on the technical ground that this novel step in the process has been expressed in structural rather than abstract terms. The language of the method claims expresses throughout not a structure, but the use of a structure (see Law Item No. 15, *post* pp. 84-7).

There was therefore no error in the ruling of the Ninth Circuit Court of Appeals expressed by Judge Wilbur as follows (I, 532):

"Appellee further contends that the process claims are invalid because specifying apparatus to be used in the process . . . These contentions are without merit. A patent is not invalid because requiring specific apparatus in carrying it out. Expanded Metal Co. v. Bradford, 214 U. S. 366, 53 L. Ed. 1034; Lawther v. Hamilton, 124 U. S. 1, supra; Owen v. Perkins Oil Well Cementing Co., 38 F. (2d) 30".

Defendants ask this Court to eliminate from the method claims (their brief p. 49) this feature of the invention thus expressed in the manner agreed upon between the applicant and the examiner, and to give no weight to this novel feature of Simmons' invention (their brief pp. 67-8). Defendants acknowledge that in a case where a patentee has eliminated a step of a prior process, yet secured the same or more advantageous results, this alteration alone may amount to patentable invention, citing *Lawther* v. *Hamilton*, 124 U. S. 1. Defendants assert, however, that the instant case does not come within the rule of *Lawther* v. *Hamilton* but "really falls within the rule of *Richards* v. *Chase Elevator Co.*, 159 U. S. 477, 486, 16 S. Ct. 53, that the elimination of an element with its corresponding function does not amount to invention" since "When Simmons abandoned the second string * * * he also abandoned the function of such second string, viz.: to maintain * * * circulation" (defts.' brief, p. 68). But this is not a fair statement of the matter. In a rotary drilled well the function of the circulating mud and of the second string of pipe by which it is maintained is to support the walls of the hole and prevent cave-ins and "freezing" of the tools in the well (*ante*, p. 8). This is undisputed. In the Simmons process both the circulation and the second string are dispensed with, but their function is retained. The walls of the hole are still maintained and the testing tool does not "freeze" in the well. The result of the process, in this respect, is the same as before. The advantages over the old processes have already been pointed out. It is submitted that this situation falls clearly within the rule of *Lawther* v. *Hamil-*

ton as reaffirmed in *Richards* v. *Chase;** and that this element of novelty in the Simmons process may be given full weight by this Court.

Furthermore, as we have previously pointed out, the omission of the circulation and the use of the drill string as the sample chamber is not the only important distinction between the Simmons method and that of Cox and Edwards. Neither Cox nor Edwards discloses any procedure for entrapping and lifting to the surface an uncontaminated sample from which the possible production of the formation may be measured, so that in any event it is clear that defendants' argument based on the assertion that "the only novelty" of the method claims resides in structural limitations, is without foundation.

Defendants' Assignment of Error No. 5.

Defendants assert that "The method claims are not the subject matter of patent protection at all" (brief, pages 8, 52). In support of this contention they rely on the definition of a process given in *Cochrane* v. *Deener*, 94 U. S. 780, 788:

> "A process is a mode of treatment of certain materials to produce a given result. It is an act or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing".

The reference to a change of the subject matter to a different state or thing, defendants interpret as requiring either the production of a tangible new product or a change in physical or chemical character of an old product. They say that Simmons' method "changes nothing except the location of that sample," of oil entrapped in the testing device and therefore is not a patentable process (brief p. 54).

The rule of the Lawther Case was reaffirmed in Richards v. Chase where the Court said: " * * the omission of an element in a combination may constitute invention, if the result of the new combination be the same as before * * *." (159 U. S. 477, 486).

We do not think that in the *Cochrane* v. *Deener* case this Court intended to restrict the scope of a patentable process in the way suggested by defendants. The reference to a change of the subject matter to a "different *state*" as well as to a different "*thing*" seems to us to exclude the necessity of an actual physical change in the thing acted upon. This interpretation, rather than defendants' brings it into harmony with this Court's definitions of a process in other cases both before and after the decision in *Cochrane* v. *Deener*. See *Corning et al.* v. *Burden*, 15 How. 252, 268; *Tilghman* v. *Proctor*, 102 U. S. 707, 728; *The Telephone Cases*, 126 U. S. 1, 532; *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366, 382-6; *Waxham* v. *Smith*, 294 U. S. 20, 21-2.

In *Eames* v. *Andrews*, 1 2 U. S. 40, 54, the process consisted "in the new application of a power of nature, by which new application a new and useful result is attained. There is no new product, but an old product—water—is obtained from the earth in a new and advantageous manner." (See also definition of same process in *Beedle* v. *Bennett*, 122 U. S. 71, 78).

Certainly if the removal of water from the earth "in a new and advantageous manner" is a patentable process, then the removal of oil from the earth in a new and advantageous manner is likewise a fit subject matter of patent protection. Again, separating oil from the earthy formation in which it occurs cannot be significantly distinguished from separating valuable mineral from the earthy gangue with which it is commingled, yet this Court held such a process patentable in *Mineral S ration* v. *Hyde*, 242 U. S. 261. Similarly the method of withdrawing molten metal from a furnace which was subjected to the scrutiny of this Court in *Keyes* v. *Grant*, 118 U. S. 25, 28, seems to us indistinguishable from "a method of moving an object from one place to another" which defendants declare to be unpatentable subject matter (defts.' brief p. 54).

We submit that defendants' interpretation of *Cochrane* v. *Deener* must be rejected.

THE LAW APPLICABLE TO THIS CASE

Item 1. This Court has always considered that novelty in the means and in the result is the primary test of invention. In *Expanded Metal Co. v. Bradford*, 214 U. S. 366, this Court, in sustaining Golding's patent for a method of producing expanded metal, which method involved mechanical operations, said (p. 381):

> "There is nothing in the prior art that suggests the combined operation of the Golding patent in suit. It is perfectly well settled that a new combination of elements, old in themselves, but which produce a new and useful result, entitles the inventor to the protection of a patent. *Loom Co. v. Higgins*, 105 U. S. 580, 591."

See also *Potts v. Creager*, 155 U. S. 597, 608.

It is not, of course, sufficient that the process merely be new in the sense that it had never existed before. If the improvement was so plainly indicated by the prior art that when the need became apparent the art had "ready at hand the knowledge which would enable one skilled in the art to satisfy it", then the process is lacking in patentable novelty. *DeForest Radio Co. v. General Electric Co.*, 283 U. S. 664, 682, 685. If, for instance, the method of the patent in suit had been suggested in the Franklin patent and its applicability to the testing of rotary drilled wells had been recognized, this knowledge would defeat the novelty of the process in the sense of the patent law even though the process had not actually been so applied. The reason for this is plain enough, for the purpose of the patent law is to reward those who actually make some contribution to the sum of human knowledge.

In the instant case there is, however, no suggestion of the Simmons method in Franklin's patent nor is there any other evidence of any knowledge on the part of those skilled in the art that such a process could be applied to produce Simmons' new result. The evidence is that those skilled

in the art were unable to solve the problem although they had unsuccessfully tried to do so in several ways. Upon the evidence the world owes its knowledge that such a process can be used to Simmons.

Thus from an *objective* viewpoint, the method of the patent in suit fully responds to the test of invention established by this Court.* It is only by approaching the subject from a *subjective* viewpoint and speculating after the event and without evidence, on what might or might not have been obvious to a man skilled in the art, that one can possibly deny to the method of the patent in suit the attributes of a patentable invention. It is by this process of reasoning as to what might or might not have been obvious to a man skilled in the art that the Court of Appeals for the Fifth Circuit reached its decision. (88 F. (2d) 270-3)

We submit that where the evidence shows that a patentee has attained a new result in a manner not clearly suggested by the prior art, patentability follows as a conclusion of law and courts should not speculate without any evidence and after the event as to what might or might not have been obvious to the man skilled in the art. As this Court pointed out in *Diamond Rubber Co. v. Consolidated Tire Co.*, 220 U. S. 428, 435, "the law has other tests of the invention than subtle conjectures of what might have been seen and yet was not."

Item 2. There are many cases, however, where it is not clear from the evidence whether the advance made by the patentee is really new or whether it is indicated in the prior art with sufficient certainty to negative novelty. In

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*Smith v. Goodyear, etc., Co., 93 U. S. 486, 492-7; New Process, etc., Co. v. Maus, 122 U. S. 413, 423-7; Seabury v. Am Ende, 152 U. S. 561, 567; Diamond, etc., Co. v. Consolidated etc., Co., 220 U. S. 428, 435-43; Eibel Process Co. v. Minn., etc., Co., 261 U. S. 45, 52, 68; Minerals Separation v. Hyde, 242 U. S. 261, 266-70; Holland, etc., Co. v. Perkins, etc., Co., 277 U. S. 245, 255; DeForest, etc., Co. v. General Electric Co., 283 U. S. 664, 678-9.

such cases this Court has looked to the history of the art to resolve the doubt and determine from the actual experience of the industry whether or not the knowledge available at that date was indeed such as to make available for the purpose the very means disclosed and claimed in the patent.

Evidence that the defects in existing testing methods for rotary drilled wells had long been recognized, that attempts of earlier inventors to solve the problem had resulted in failure and that the process of the patent in suit solved the problem, leads inevitably in the instant case to the conclusion that the art did not have "ready at hand the knowledge which would enable one skilled in the art to satisfy" the existing need. *DeForest Radio Co.* v. *General Electric Co.*, 283 U. S. 664, 685. This Court has time and again relied upon objective evidence of this kind either in confirmation of its finding of novelty or to resolve any doubt which it had on that score. For instance, in *Loom Co.* v. *Higgins*, 105 U. S. 580, this Court said (p. 591):

> "But it is plain from the evidence, and from the very fact that it was not sooner adopted and used, that it did not, for years, occur in this light to even the most skillful persons. * * * Now that it has succeeded it may seem very plain to any one that he could have done it as well. This is often the case with inventions of the greatest merit."

Again, in *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366, this Court said (p. 381):

> "It may be safely said that if those skilled in the mechanical arts are working in a given field and have failed after repeated efforts to discover a certain new and useful improvement, that he who first makes the discovery has done more than make the obvious improvement which would suggest itself to a mechanic skilled in the art, and is entitled to protection as an inventor."

In the case of *Consolidated Valve Co.* v. *Crosby Valve Co.*, 113 U. S. 157, this Court said (p. 179):

> "The fact that the known valves were not used, and the speedy and extensive adoption of Richardson's valve, are facts in harmony with the evidence that his valve contains just what the prior valves lacked, and go to support the conclusion at which we have arrived on the question of novelty."

In *Potts* v. *Creager*, 155 U. S. 597, this Court said (p. 608):

> "The apparent simplicity of a new device often leads an inexperienced person to think that it would have occurred to any one familiar with he subject; but the decisive answer is that with dozens and perhaps hundreds of others laboring in the same field, it had never occurred to any one before. The practised eye of an ordinary mechanic may be safely trusted to see what ought to be apparent to every one."

See also to the same effect *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U. S. 403, 422; *Keystone Mfg. Co.* v. *Adams*, 151 U. S. 139, 144; *Hildreth* v. *Mastoras*, 257 U. S. 27, 34-5.

This Court has frequently relied upon evidence of immediate adoption of the invention, particularly where the invention has supplanted existing methods, as persuasive not only that the patentee has made a valuable contribution to the useful arts but also that this contribution was not within the knowledge available to the man skilled in the art for, if it had been, it is natural to suppose that such a valuable improvement would have been adopted sooner to fill the existing need. See *Hobbs* v. *Beach*, 180 U. S. 383, 393; *Topliff* v. *Topliff*, 145 U. S. 156, 164; *Sessions* v. *Romadka*, 145 U. S. 29, 44; *New Process etc. Co.* v. *Maus*, 122 U. S. 413, 424; *Minerals Separation Co.* v. *Hyde*, 242 U. S. 261, 270; *Eibel Process Co.* v. *Minnesota etc. Co.*, 261 U. S. 45, 68.

Item 3. The apparent incredulity of well drillers that the Simmons scheme was feasible and their unwillingness to risk their wells in what seemed to them so radical and hazardous an undertaking further strikingly demonstrates the novelty of Simmons' invention.

See *Eibel Process Co.* v. *Minnesota etc., Co.*, 261 U. S. 45, 55 and 60; *McKee et al.* v. *Graton & Knight Co.*, (C. C. A. 4), 87 F. (2d) 262, 263; *National Battery Co.* v. *Richardson Co.* (C. C. A. 6); 63 F. (2d) 289, 292; *Straub* v. *Campbell* (C. C. A. 3) 259 Fed. 570, 571.

Item 4. Judge Wilbur's finding of novelty is supported in this case by the action of the patent office in issuing the patent after a consideration of the same prior art that is now relied upon by defendants. This action of the patent office is presumed to be correct. *Agawam Co.* v. *Jordan*, 7 Wall. 583, 597; *Mitchell* v. *Tilghman*, 19 Wall. 287, 390; *Diamond Rubber Co.* v. *Consolidated Tire Co.*, 220 U. S. 428, 434. This presumption has increased weight where as here the patent has undergone close scrutiny by the various tribunals of the patent office in interference proceedings. *Hildreth* v. *Mastoras*, 257 U. S. 27, 32. See also to the same effect *Radio Corp.* v. *Radio Engineering Labs.*, 293 U. S. 1, 7.

Item 5. It is well settled that in order to defeat the novelty of a patented invention by means of prior printed publications or patents, the description contained in the earlier publication must

> "exhibit a substantial representation of the patented improvement, in such full, clear, and exact terms as to enable any person skilled in the art or science to which it appertains, to make, construct, and practice the invention to the same practical extent as they would be enabled to do if the information was derived from a prior patent. Mere vague and general representations will not support such a defence * * *." (*Eames* v. *Andrews*, 122 U. S. 40, 66)

Seymour v. Osborne, 11 Wall. 516, 555;
Cohn v. United States Corset Co., 93 U. S. 366, 370;
Carnegie Steel Co. v. Cambria Iron Co., 185 U. S. 403, 419-20;
Tilghman v. Proctor, 102 U. S. 707, 711-12;
Topliff v. Topliff, 145 U. S. 156, 161;
Skelly, etc., Co. v. Universal, etc., Co., C. C. A. 3, 31 F. (2d) 427, 431.

"A document [patent] so obscure in its terminology that two conflicting theories may be deduced therefrom and supported by equally plausible arguments is too indefinite to be utilized as an anticipation." (*Cimiotti Unhairing Co. et al. v. Comstock Unhairing Co.*, 115 Fed. 524)

Item 6. The rule is well established in this Court that slight changes, otherwise within the range of mechanical skill, are enough to give the changed apparatus the status of a patentable invention if the changes were dictated by a new purpose first disclosed by the patentee.

In *National Cash Register Co. v. Boston, etc., Co.*, 156 U. S. 502, this Court, in sustaining a claim for an improvement in cash register machines, said (p. 514):

"Given these [the patentee's] conceptions, it was more a matter of mechanical skill than of invention to devise such connection, since a similar train of mechanism had been operated by the keys for other purpose. * * * While the use was to a certain extent an analogous one and the mechanism was probably suggested by that employed to ring the bell, there was nothing to suggest that the object to be obtained * * * could be accomplished by subdividing the force exerted by the key * * *."

In *Consolidated Valve Co. v. Crosby Valve Co.*, 113 U. S. 157, the Court in sustaining a patent for a valve said (p. 171):

"Taught by Richardson, and by the use of his apparatus, it is not difficult for skilled mechanics to take the prior structures and so arrange and use them as to produce more or less of the beneficial results first made known by Richardson; but, prior to 1866, though these old patents and their descriptions were accessible, no valve was made producing any such results."

See also *Hobbs* v. *Beach*, 180 U. S. 383, 391; *Topliff* v. *Topliff*, 145 U. S. 156, 161, 163; *Eibel Process Co.* v. *Minnesota, etc., Co.*, 261 U. S. 45, 66-7.

Item 7. It is well settled that ex parte tests regarding the ability of prior devices to perform the function of the device of the patent in suit have little weight, are subject to grave suspicion, and every doubt should be resolved against them where it appears that the prior device was never in fact used to perform the function of the patent in suit. *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U. S. 403, 420-1; *Kuehnsted* v. *Farbenfabriken, etc., Co.* (C. C. A. 7), 179 Fed. 701, 707; *Carson* v. *American, etc., Co.* (C. C. A. 9), 4 F. (2d) 463, 465-6; *Chadeloid Chemical Co.* v. *Wilson etc. Co.* (D. C. S. D. N. Y.), 220 Fed. 681, 682.

Item 8. Success is not anticipated by failure. Where the patentee is the first to solve a problem, his right to a patent cannot be defeated by the work of others no matter how close they may have come to success, if their efforts actually resulted in failure.

The *Telephone Cases*, 126 U. S. 1, 544-5; *Consolidated Valve Co.* v. *Crosby Valve Co.*, 113 U. S. 157, 170-1, 179; *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U. S. 403, 422, 429, 446; *The Barbed Wire Patent Case*, 143 U. S. 275, 282-4; *Hall Signal Co.* v. *General Ry. Signal Co.* (C. C. A. 2), 169 Fed. 290.

Item 9. The persuasive effect of widespread success of the patented invention is not to be denied to the patentee

because the specific embodiment of his invention described in his patent may have been improved upon either by the patentee or by others. *Sessions* v. *Romadka*, 145 U. S. 29, 43, 45; *Tempco Co.* v. *Apco Co.*, 275 U. S. 319, 324-5, 328; *Hildreth* v. *Mastoras*, 257 U. S. 27, 34.

Defendants' contention that the commercial success of the patent in suit, in order to benefit the patentee, "must be confined to the device shown and described in such patent" (brief, p. 15), is not supported by any authority. The case of *Duer* v. *Corbin etc. Co.*, 149 U. S. 216, cited by defendants, is not in point. In that case the device of the patent had considerable commercial success and the Court said (223-4):

> "Were the question of patentability one of doubt this might suffice to turn the scale in favor of the patentee."

The Court, however, felt constrained to hold the patent invalid because it was lacking in novelty.

Item 10. The burden of proof to make good the defense of prior invention is "upon the party setting it up," and "every reasonable doubt should be resolved against him". *Coffin* v. *Ogden*, 18 Wall. 120, 124; *Cantrell* v. *Wallick*, 117 U. S. 689, 695-6; *The Barbed Wire Patent*, 143 U. S. 275, 285; *Deering* v. *Winona Harvester Works*, 155 U. S. 286, 301; *Radio Corp.* v. *Radio Engineering Labs. Inc.*, 293 U. S. 1, 7.

Item 11. Infringement of a method claim is not avoided by a variation in the structural form of the apparatus used in applying the method. *Smith* v. *Snow*, 294 U. S. 1, 20; *Warham* v. *Smith*, 294 U. S. 20, 23; *Tilghman* v. *Proctor*, 102 U. S. 707, 730-2; *Cochrane* v. *Deener*, 94 U. S. 780, 788-9; *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366, 383-4.

Item 12. Infringement is not avoided, where the substance of the invention is adopted, by the addition to the combination claimed of additional apparatus such as auxiliary valves. *Machine Co.* v. *Murphy*, 97 U. S. 120, 124-5; *Hobbs* v. *Beach*, 180 U. S. 383, 401; *1900 Washer Co.* v. *Kraemer* (C. C. A. 3), 169 Fed. 629, 633-4; *Voices* v. *Uneeda Doll Co.* (C. C. A. 2), 32 F. (2d) 673, 675.

Item 13. Limitations contained in certain apparatus claims of the patent will not be read into other apparatus claims in which these limitations are not included. *Smith* v. *Snow*, 294 U. S. 1, 13-14; *Symington* v. *National Casting Co.*, 250 U. S. 383, 385; *Lampson, etc. Co.* v. *Hellman* (C. C. A. 7), 123 Fed. 416, 419; *National Tube Co.* v. *Mark* (C. C. A. 6), 216 Fed. 507, 521; *Electric etc. Co.* v. *General Electric Co.* (C. C. A. 2), 88 F. (2d) 11, 16.

Item 14. Where a defendant has adopted the substance of the patented invention, he infringes the patent even though he may have improved upon the invention, and this is true irrespective of whether defendant's improvement is patentable or not. *Cochrane* v. *Deener*, 94 U. S. 780, 787; *Machine Co.* v. *Murphy*, 97 U. S. 120, 125; *Cantrell* v. *Wallick*, 117 U. S. 689, 694; *Tempco* v. *Apco*, 275 U. S. 319, 328.

Item 15. It is perfectly proper to include reference to structure in a method claim. Defendants apparently assert the contrary. They say "To be patentable, a method must be independent of the function or utility of any particular piece of apparatus. *Tilghman* v. *Proctor*, 102 U. S. 707, 722" (brief, p. 48). The Tilghman case is authority for the proposition that a process may be patented irrespective of the particular machine or mechanical device for carrying out the process. But it was recognized by the Court that reference to structure is not out of place in a process patent for it was said "Neilson's patent was for the process of applying the hot blast to furnaces by forcing

the blast *through a vessel or receptacle* situated between the blowing apparatus and the furnace and heated to a red heat; the form of the heating vessel being stated by the patent to be immaterial. These views were sustained after the strictest scrutiny and against the strongest opposition" (102 U. S. 722). There is a discussion of this same Neilson patent in *O'Reilly* v. *Morse*, 15 How. 62, 115-16.

This court has frequently sustained process claims which have included references to mechanical instrumentalities as an element thereof. Thus in the early cases of *Mowry* v. *Whitney* a claim for a process of making wheels for rail-cars was sustained although one step of the process called for "depositing (the wheels) *in a previously-heated furnace or chamber*, so constructed, of such materials, and subject to such control that the temperature of all parts of the wheels deposited therein, may be raised to the same point * * *" (14 Wall. 620, 29).

In *Cotton-Tie Company* v. *Simmons*, 106 U. S. 89, 92, a claim for "the method of baling cotton *with metallic bands* * * * by bending the same at any desired point into the form of a loop, and passing such loop sidewise *through an open slit* into *the slot* intended to receive it and *over the bar of the clasp* intended to hold it" was held valid and infringed.

In *Keyes* v. *Grant*, 118 U. S. 25, 28, the lower court directed a verdict of invalidity for lack of invention over the prior art. This Court reversed the decision on the ground that the question should have been put to the jury. The claim in that case read: "The method of tapping or withdrawing molten lead or other metals from a smelting furnace *by means of the basin B and tube or connection C, in combination with the furnace* substantially as shown and described." The patent was later sustained by the Circuit Court and no appeal taken. (*Keyes* v. *Pueblo Smelting, etc., Co.*, 36 Fed. 179).

In the recent case of *Smith* v. *Snow*, 294 U. S. 1; "The method of hatching a plurality of eggs by arranging them at different levels *in a closed chamber having restricted*

openings of sufficient capacity for the escape of foul air without undue loss of moisture, etc. * * *" was sustained as a valid process claim. In a subsequent case this claim was attacked as being for the function of the machine disclosed. The defense was rejected (*Waxham* v. *Smith*, 294 U. S. 20, 21-2).

In *Lawther* v. *Hamilton*, 124 U. S. 1, the question was discussed at some length. The patent related to a process of treating linseed to extract oil therefrom. In the prior art process the seeds were passed through rollers under pressure, then ground by muller-stones and finally treated with steam and thoroughly mixed prior to being subjected to pressure to extract the oil therefrom. Lawther, the patentee, observed that if sufficient care were taken each seed could be crushed while passing through the rollers and that further grinding was injurious. He accordingly omitted the second step in the process-grinding by muller-stones.

The lower Court dismissed the bill, saying that Lawther had "simply omitted one of the instrumentalities previously used in the first stage of treatment of the seed. This was undoubtedly a useful improvement, but it was not the invention or discovery of a new *process*. . . . The discovery or invention was not of a new series of acts or steps constituting a process, but only of certain mechanical changes in carrying into effect the well-known old steps of the process." (emphasis ours)

This Court reversed the lower court's decision, saying (124 U. S. 6):

> "The view thus taken by the court below seems to us open to some criticism. If, as that court says, and we think rightly says, the omission of the muller-stones is a real improvement in the process of obtaining the oil from the flax-seed; if it produces more oil and better oil-cakes, and it is new, and was not used before; why is it not a patentable discovery? And why is not such new method of obtaining the oil and making the

oil-cakes a process? There is no new machinery. The rollers are an old instrument, the mixing machinery is old, the hydraulic press is old; *the only thing that is new is the mode of using and applying these old instrumentalities. And what is that but a new process?* This process consists of a series of acts done to the flaxseed. It is a mode of treatment. The first part of the process is to crush the seed between rollers.

* * * * * *

But whilst we are satisfied that the invention is that of a process, it is nevertheless limited by the clear terms of the specification, at least so far as the crushing of the seed is concerned, *to the use of the kind of instrumentality described*, namely, in the first part of the process, *to the use of powerful revolving rollers for crushing the seed* between them under pressure." (emphasis ours.)

So in the present case, the Simmons method of extracting oil from a formation in a well filled with drilling fluid is limited "to the use of the kind of instrumentality described", a single string of pipe. The use of a single string of pipe and its manipulation in the manner described by Simmons is a step in the Simmons process which is new and patentably distinguishes it from the methods of Cox and Edwards which involved as an essential step the operation of two strings of pipe in the well to maintain circulation.

It is perfectly plain from the foregoing cases that this Court has never rejected a patent for a process merely because the process involved the use or manipulation of tools. It hardly need be pointed out that the process of extracting a quantitative sample of oil from a formation located at the bottom of a hole below thousands of feet of drilling fluid is not one that can be performed by hand. The use of tools is absolutely necessary and to declare a claim invalid because it refers to the instrumentalities which are essential to the performance of the steps of the process would be absurd.

CONCLUSION.

We submit, therefore, that on the facts and the law the decision of the Ninth Circuit Court of Appeals upholding Simmons' method claims was correct and should be affirmed by this Court, and that because of errors of law and fact the holding that Simmons' apparatus claims 8 to 17 and 19 are invalid should be reversed and those claims held valid and infringed.

Respectfully submitted,

FREDERICK S. LYON,
WILLIAM H. DAVIS,
LEONARD S. LYON,
HENRY S. RICHMOND,
BEN F. SAYE,
for Plaintiffs.

APPENDIX

FINDINGS OF JUDGE BRYANT

IN

THE CASE

OF

ERLE P. HALLIBURTON and HALLIBURTON OIL WELL CEMENTING CO.

VS.

JOHNSTON FORMATION TESTING CORP. and EDGAR C. JOHNSTON.

IN THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS.

FINDINGS OF FACT AND CONCLUSIONS OF LAW.

Filed September 5, 1935.

1.

Plaintiff, Erle P. Halliburton, is an inhabitant of the State of California, residing at Los Angeles, in said state, and said plaintiff, Halliburton Oil Well Cementing Company, is a corporation organized and existing under and by virtue of the laws of the State of Delaware and authorized to do business in the State of Texas.

2.

The defendant, Johnston Formation Testing Corporation, is a corporation organized under and by virtue of the laws of the State of Delaware, and authorized to do

business in the State of Texas, and having a regular and established place of business in Gregg County, Texas, within the Tyler Division of the Eastern District of Texas, and there engaged in the business of manufacturing, selling and using apparatus for testing formations encountered in wells and of practicing methods of testing formations in wells.

3.

The defendant, E. C. Johnston, is the President of the defendant, Johnston Formation Testing Corporation, and that the said E. C. Johnston resides at Longview, in Gregg County, in the Eastern District of the State of Texas.

4.

John T. Simmons, a resident of El Dorado, Arkansas, was the original and first inventor of a new and useful invention, to wit. "Method and Apparatus for Testing the Productivity of Formations Encountered in Wells" not known or used by others before his invention or discovery thereof, or patented or described in any printed publication in the United States of America, or any foreign country before his invention or discovery thereof, or more than two years prior to his application for Letters Patent thereon in the United States of America, or in public use or on sale in the United States of America for more than two years prior to such application for Letters Patent therefor, and not abandoned; on the 10th day of February, 1926, the said John T. Simmons made an application in writing in due form of law to the Commissioner of Patents of the United States of America for Letters Patent on said invention, complying in all respects with the requirements of said law, said application being known as Ser. No. 87,323.

5.

By assignment in writing the said John T. Simmons assigned, transferred and set over to the plaintiff, Erle

P. Halliburton, all of the right, title and interest in and to said application for Letters Patent for "Method and Apparatus for Testing the Productivity of Formations Encountered in Wells" and the inventions described and disclosed therein, and requested the United States Patent Office to issue any and all Letters Patent issued on said application to Erle P. Halliburton.

6.

After due proceedings had and due examination made by the Commissioner of Patents upon the aforesaid application as to the patentability of said invention, on October 17th, 1933, Letters Patent of the United States of America, No. 1,930,987, signed, sealed and executed in due form of law and bearing date the day and year aforesaid, were granted, issued and delivered by the Commissioner of Patents of the United States to the aforesaid plaintiff, Erle P. Halliburton.

7.

On or about the 9th day of October, 1933, by an instrument in writing the plaintiff, Erle P. Halliburton, granted to plaintiff, Halliburton Oil Well Cementing Company, a corporation of the State of Delaware, for the full term of and under any and all Letters Patent granted or procured on said application for Letters Patent Ser. No. 87,323, filed February 10th, 1926, unless sooner terminated as in such written instrument provided, the sole and exclusive right, license and liberty to employ the inventions described and claimed in and by application for Letters Patent, Ser. No. 87,323, and the invention described and claimed in said Letters Patent No. 1,930,987; in and throughout the United States of America and the territories thereof, upon the terms and conditions in said instrument set forth, including the payment of a royalty upon each and every testing job performed under said license by said plaintiff, Halliburton Oil Well Cementing Company to

plaintiff Erle P. Halliburton; by the terms of said agreement and at all times since the 17th day of October, 1933, said plaintiff Halliburton Oil Well Cementing Company was to have, and has had, the sole and exclusive right, license and liberty to employ said invention patented in said Letters Patent in and throughout the United States of America, and the territories thereof.

8.

Since the issuance of the Letters Patent in suit, on the 17th day of October, 1933, and at the time of the commencement of this suit, Erle P. Halliburton, plaintiff above named, was the sole and exclusive owner of the entire right, title and interest in and to the Letters Patent aforesaid, and Halliburton Oil Well Cementing Company, plaintiff above named, was the sole and exclusive licensee under said Letters in and for all the states and territories of the United States.

9.

Plaintiffs have developed a large business in this and foreign countries under the patent in suit and the apparatus for testing formations in wells and the methods of testing formations in wells have come into universal use and have become the standard apparatus and methods employed in testing the formations encountered in the drilling of oil wells throughout the oil producing fields of the United States; that said inventions have been and are of great benefit and have saved the oil industry millions of dollars.

10.

Prior to the discovery of the inventions disclosed and claimed in said Letters Patent by the said John T. Simmons, there was no apparatus or method in use for testing the productivity of formations encountered in drilling wells containing drilling fluid whereby a sample of the cognate fluid from the formation to be tested could be ob-

tained except by setting a string of casing in the well adjacent to the formation to be tested and then bailing or pumping or otherwise removing the drilling fluid from the casing.

11.

Letters Patent in suit, No. 1,930,987, and particularly Claims 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 thereof, describe and define a new and patentable invention and are good and valid in law.

13.

From October 17th, 1933, and up to the time of the trial of this cause, the defendant Johnston Formation Testing Corporation has been engaged in the business of manufacturing, selling and using apparatus, and of practicing methods utilizing the inventions of the Letters Patent in suit without license so to do, and has evidenced its intention to continue such business unless enjoined therefrom.

14.

The testing apparatus manufactured, used and sold by the defendants comprised a string of pipe to be lowered into a well having an inlet at its lower end and carrying a packer adapted to be positively pressed against the walls of the formation to seal off the same above the inlet, and a valve for the inlet positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

15.

The testing apparatus manufactured, used and sold by the defendant comprised a string of pipe to be lowered into the wells, a packer carried by the pipe, said packer adapted to be positively pressed against the walls of the formation to seal off the same and means at the lower

end of the pipe to receive a sample from the well including an inlet and a valve for controlling the inlet, the valve being positively controlled by movement of the pipe to open and close the inlet while the packer is seated.

16.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants included an empty string of pipe to be lowered in the well to adjacent the formation to be tested, means at the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve for controlling the inlet, and means carried by the pipe for sealing the well above the inlet, said means consisting of a packer adapted to be positively pressed against the walls of the formation to seal off the same, the valve being positively controlled by movement of the pipe.

17.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants included a single string of pipe to be lowered into the well to adjacent the formation to be tested, a valved inlet at the lower end of the pipe positively controlled from the top of the well by movement of the pipe and a packer carried by the pipe above the inlet, said packer being adapted to be positively pressed against the walls of the formation to seal off the same.

18.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants included an empty string of pipe to be lowered into the well to adjacent the formation to be tested, a packer carried by the pipe adapted to be positively pressed against the walls of the formation to seal off the same, means at

the lower end of the pipe to receive a sample from the formation including an inlet opening into the pipe and a valve structure for controlling the inlet, the valve structure including a plurality of relatively movable parts one of which is secured to the pipe and another of which is connected to the packer.

19.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants included a single empty string of pipe to be lowered into the well to adjacent the formation to be tested, means lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said sealing means being adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive a sample from the formation including an inlet opening into said pipe and a valve structure for controlling the inlet, said valve structure including a part connected to said sealing means and a part connected to said pipe.

20.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants comprised a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer, and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe.

21.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants comprised a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer carried by the pipe for sealing off the well above the formation, an inlet below the packer opening into the pipe, said packer adapted to be positively pressed against the walls of the formation to seal off the same, and a valve for the inlet, the setting of the packer and the operation of the valve being positively controlled by movement of the pipe.

22.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants comprised a single string of pipe to be lowered into the well through the drilling fluid, said pipe being closed against the entrance of the drilling fluid, means at the lower end of the pipe for receiving a sample including an inlet opening into the pipe, means carried by the pipe for sealing the well above the inlet, said sealing means adapted to be positively pressed against the walls of the formation to seal off the same and a valve for the inlet that may be positively opened and closed by movement of the pipe while the well is sealed above the inlet.

23.

The testing apparatus for testing wells containing drilling fluid manufactured, used and sold by the defendants comprised a string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to receive a fluid sample therefrom and to be raised out of the well to remove the entrapped sample, said pipe being closed against the flow of the drilling fluid as the pipe is

lowered into the well, a packer carried by the pipe as the pipe is lowered into the well and adapted to be seated by manipulation of the pipe to seal off the well above the formation, said packer adapted to be positively pressed against the walls of the formation to seal off the same, an inlet to the pipe communicating with the well below the point at which the packer seals off the well, and means for controlling the inlet to permit fluid from the formation to enter the pipe while the packer is set and to prevent fluid from entering the pipe after the packer is released and the pipe is being raised out of the well.

24.

The method practiced by the defendants in testing the productivity of formations encountered in a well containing drilling fluid included the lowering of an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer and having a valved inlet at its lower end which is closed while the pipe is being lowered setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer was set to permit cognate fluid from the formation to enter the pipe, closing the valved inlef against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well.

25.

The method practiced by defendants in testing the productivity of formations encountered in wells containing drilling fluid involved the insertion of only a single string of pipe into the well to make a test, which included lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation

and opening the valve to permit cognant fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against the entrance of fluid from the well to remove an entrapped sample.

26.

The defendants, Johnston Formation Testing Corporation, a corporation, and E. C. Johnston, were duly notified in writing of the infringement of letters patent in suit complained of herein October, 1933, and during the entire life of the patent have had knowledge of said Letters Patent.

27.

The defendants have infringed upon each of Claims 9, 10, 11, 12, 13, 14, 15, 16, 17 and 19, by manufacturing, selling and using apparatus like devices illustrated and described in plaintiffs' Exhibit 14.

28.

The defendant Johnston Formation Testing Corporation has infringed upon each of claims 8 and 18 by practicing the methods set out in Findings 24 and 25 herein.

29.

The Stewart Patent No. 171,589, defendants' Exhibit 15, describes a woven hemp packer and has no valve in the inlet below the packer. Such device does not and cannot be operated to control the flow of cognate fluid from a formation into the pipe.

30.

The Franklin Patent No. 263,330, defendants' Exhibit 20, describes a device to control and regulate the flow

of a completed oil well and to keep oil from flowing through the tubing when it is being put into the well or withdrawn from it. This device of the Franklin patent does not contain the elements necessary to test a formation in a well. An entrapped sample could not be removed from a well with this device because it is so constructed that any fluid in the pipe above the part D will escape between the part D and the part C when the tubing is being removed from the well. This device has no packer by which the well can be sealed above the formation to be tested from the drilling fluid contained in the well. In fact it is a device to be used where no drilling fluid is contained in the well.

31.

The Cooper Patent No. 1,000,583, defendants' Exhibit 24, is for a packer for operating gas, water and oil wells and does not disclose an apparatus or method for testing the productivity of formations encountered during drilling a well. The Cooper device is for use in a completed well for recovering gas and oil from a well formation which includes water strata with oil or gas strata. The Cooper patent does not disclose a method or apparatus for recovering an entrapped sample of fluid, but discloses an apparatus and method of securing fluid from an oil or gas well by pumping or bailing. The Cooper patent does not disclose an apparatus or method using a single string of pipe, but the apparatus and method of the Cooper patent requires the use of two strings of pipe.

32.

The Cox patent No. 1,347,534, defendant's Exhibit 25, is for a device for testing wells for oil, gas, etc. The Cox tester employs two tubes or pipes while the patent in suit employs but a single pipe. If operable at all, Cox's device must employ both of the pipes that his patent describes and discloses. Cox's device does not have a valve which is operated by movement of the pipe. The Device

of the Cox patent has no valve which can be controlled to prevent the entrance of drilling fluid into the test tube when the apparatus is being withdrawn from the well. The Cox patent does not disclose or teach the methods of Claims 8 and 18 of the patent in suit.

33.

The Edwards patent No. 1,514,585, defendants' Exhibit 28, is for a device for testing wells for oil, gas, etc. The Edwards tester employs two tubes or pipes while the patent in suit employs but a single pipe. The Edwards patent does not describe an apparatus or method of testing a well by which a sample from the well may be entrapped and the pipe raised so that the sample can be examined. The Edwards patent discloses an apparatus and method in which a pump is used to pump out the fluid from the stratum, where the fluid is under insufficient pressure to flow from the apparatus. The Edwards patent contemplates a different method of operation than the Simmons patent. The device of the Edwards patent requires both of the pipes 1 and 8, and the pipe 1 must carry the packer. The pipe 8 and sleeves 7 of the Edwards patent could not be used for testing a well without the simultaneous use of the outer pipe 1 and the packer 5. When the pipe 8 and sleeve 7 of the Edwards device are raised from the well, the pipe 8 will not be maintained closed.

34.

None of the prior patents pleaded and introduced in evidence by the defendant, viz: Kewley 58,837; Burr and Wakelee 68,350; Carll 73,577; Stewart 171,589; Birge 193,915; Koch 208,610; Stewart 230,080; Dowar 249,228; Franklin 263,330; Cavallaro 524,666; McGregor 582,828; Bloom 785,933; Cooper 1,000,583; Cox 1,347,534; Halliday 1,474,680; Boynton 1,508,771; Edwards 1,514,585; and Macready 1,522,197; (Defendants' Exhibits 12 to 29 inclusive).

describe a method or an apparatus adapted for determining the productivity of a formation encountered in drilling a well which requires the insertion of only a single string pipe or tester in the well; nor do any of the patents just enumerated describe or disclose a method or apparatus adapted to recover an entrapped sample of cognate fluid from a formation encountered in drilling a well.

35.

That an Interlocutory Decree be entered in this cause finding that the Letters Patent in suit are valid and that Claims 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19, have been infringed as aforesaid, directing an injunction be issued restraining the defendants from further infringement of the Letters Patent in suit and referring this cause to a Special Master to ascertain the profits and damages derived from or arising out of the infringement of said Letters Patent by the defendants.

36.

The Simmons patent in suit is the first patent to disclose an apparatus and method for testing the productivity of formations encountered in drilling a well requiring only a single strip of pipe or tubing.

37.

The apparatus and methods of the patent in suit were not in open, notorious public use by Charles R. Edwards of Houston, Texas, for more than two years, or for any other period, or at all, prior to the filing date of the application for Letters Patent in suit No. 1,930,987.

38.

The apparatus and methods of the patent in suit were not in open, notorious public use by Walter C. Parks of

Iowa Park, Texas, for more than two years, or for any other period, or at all, prior to the filing date of the application for Letters Patent in suit, No. 1,930,987.

39.

The inventions of the patent in suit were not disclosed nor communicated directly or indirectly to John T. Simmons by Charles R. Edwards of Houston, Texas.

40.

The inventions of the patent in suit were not disclosed nor communicated directly or indirectly to John T. Simmons by P. E. Carter of Shreveport, Louisiana.

41.

The inventions of the patent in suit were not disclosed nor communicated directly or indirectly to John T. Simmons by Hubert E. Philp of Shreveport Louisiana.

42.

John T. Simmons is the sole, only and original, inventor of the inventions disclosed and claimed in United States Letters Patent in suit No. 1,930,987, and was not a joint inventor of the same with P. E. Carter and Hubert E. Philp, or either of them, or with any other person or persons.

The foregoing findings of fact and conclusions of law are hereby settled and adopted this 5th day of September, 1935.

RANDOLPH BRYANT,
United States District Judge.

SUPREME COURT OF THE UNITED STATES.

Nos. 466, 479.—October Term, 1938.

Honolulu Oil Corporation, Ltd. and M. O. Johnston Oil Field Service Corporation, Petitioners, 466 *vs.* Erle P. Halliburton and Halliburton Oil Well Cementing Company. Erle P. Halliburton and Halliburton Oil Well Cementing Company, Petitioners, 479 *vs.* Honolulu Oil Corporation, Ltd. and M. O. Johnston Oil Field Service Corporation.	On Writs of Certiorari to the United States Circuit Court of Appeals for the Ninth Circuit.

[April 17, 1939.]

Mr. Justice Butler delivered the opinion of the Court.

This suit presents questions of validity and infringement of Patent No. 1,930,987 applied for February 10, 1926 by Simmons and, after assignment, issued October 17, 1933, to Halliburton. It is for a method and apparatus for testing productivity of formations encountered in oil and other deep wells drilled by the rotary method.

The writs were granted, on petition of defendants Honolulu Oil Corporation, Ltd. et al. and cross-petition of plaintiffs Halliburton, et al., to review a decree[1] of the circuit court of appeals for the ninth circuit holding that the method claims are valid and infringed and to that extent reversing a decree[2] of the district court of southern California holding that the method and apparatus claims are invalid.

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[1] 98 F. (2d) 436.

[2] 18 F. Supp. 58.

There was an earlier suit for infringement of the same patent brought by these plaintiffs in the federal court for the eastern district of Texas against other defendants. That court sustained the patent and found it infringed. The circuit court of appeals for the fifth circuit reversed.[3] It held the method claims invalid for lack of invention and that, while the apparatus claims may define a simplifying improvement upon which a combination patent might rest, the apparatus was not of such character as to be infringed by the accused tool of defendants.

In recent years rotary drilling has been widely used in sinking deep oil wells. Boring is done by rotation of a bit attached to a steel pipe which when so used is called a "drill stem." A smaller bore, called "rat-hole", sometimes precedes, and is reamed out to obtain, the full size hole. To aid operation, drilling fluid (mud-laden water) is pumped into the upper end of the drill stem and escapes into the well at high velocity through holes in the bit. It rises through the space between the pipe and the earth walls of the well and carries to the surface cuttings made by the bit. It holds back and seals the penetrated formations. Hydrostatic pressure of the drilling fluid is very great and the fluid in a penetrated formation will not flow into the well unless it is under greater pressure. It is often desirable to secure a sample of the fluid within a stratum in the bottom of the well without removing the drilling fluid. The patent in suit is for a method and apparatus intended to accomplish that purpose.

The method claims are 8 and 18. Claim 8 is as follows: "A method of testing the productivity of a formation encountered in a well containing drilling fluid, which includes lowering an empty string of pipe into the well through the drilling fluid to adjacent the formation, the pipe carrying a packer[4] and having a valved inlet at its lower end which is closed while the pipe is being lowered, setting the packer above the formation to seal off the drilling fluid from the formation, opening the valved inlet after the packer is set to permit cognate fluid[5] from the formation to enter the pipe.

[3] 88 F. (2d) 270.

[4] Webster's New International Dictionary, 2nd ed., 1935: "*packer* . . . A device to pack the space between the wall of a well and the pipe or between two strings of pipe in a well."

[5] That is, oil, gas, water, or other fluid encountered in formations penetrated by the bit.

closing the valved inlet against the entrance of fluid from the well by movement of the pipe, raising the pipe so closed to remove an entrapped sample and the packer from the well." Claim 18 is printed in the margin.[6]

The apparatus claims in suit are 9 to 17 inclusive and 19. Claim 15 is typical: "Apparatus for testing the productivity of a formation encountered in a well containing drilling fluid, comprising a single empty string of pipe to be lowered into the well through the drilling fluid to adjacent the formation to be tested, a packer lowered into the well by said string of pipe for sealing off the drilling fluid from the formation to be tested, said packer adapted to be positively pressed against the walls of the formation to seal off the same, means at the lower end of said string of pipe to receive fluid from said formation including an inlet opening into said pipe below said packer and a valve structure for controlling the inlet, said valve structure having a relatively stationary part connected to the packer and a relatively movable part connected to the pipe."

Sustaining the claims in suit, the district court for eastern Texas found: Plaintiffs have a large business under the patent in suit: Prior to the discovery there was no apparatus or method in use for testing productivity of formations in wells containing drilling fluid except by putting in a casing and removing the fluid. This patent first disclosed testing apparatus and method requiring only a single string of pipe.

In this suit the trial court found: The Franklin Patent No. 263,-330, dated August 29, 1882, anticipates both the method and apparatus covered by the patent in suit. The use of a packer is necessarily implied from the language of the Franklin patent. Without one, that device could not perform the functions attributed to it. Plainly, it may be used as a tester: for by its use the contents of the producing stratum, sealed off from the rest of the well and unimpeded in its entry into the rat-hole by pressure of the rotary mud, can be brought undiluted to the surface by a mechan-

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[6] "18. A method of testing the productivity of a formation encountered in a well containing drilling fluid involving the insertion of only a single string of pipe into the well to make a test, which includes lowering a test string into the well through the drilling fluid with a packer carried by the string and a valve inlet at the lower end of the string closed against the entrance of fluid from the well, setting the packer above the formation and opening the valve to permit cognate fluid from the formation to enter the inlet, closing the valve to prevent the subsequent entrance of fluid from the well through the inlet and releasing the packer, and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample."

ism almost duplicating that shown by the patent in suit. A packer to separate one stratum of the oil well from another is old in the art.

And it also found: The Cox Patent No. 1,347,534, dated July 27, 1920, and the Edwards Patent No. 1,514,585, dated November 4, 1924, substantially disclose the method and device claimed in the patent in suit. The object of these patents, like that of the one in suit, was to ascertain productivity of the stratum being drilled. There was no actual commercial use of the device disclosed and claimed in the patent in suit. It was impractical, due to difficulty in operating at increased length. The inventor himself was employed to devise improvements in the valve structure. If valid at all, the patent must be restricted to its precise form. The method claims are invalid for want of invention. In important respects, defendants' devices differ in operation from the device disclosed and claimed by the patent in suit; they are not infringements of it.

And that court decreed that as to all claims in suit, the patent is invalid.

The opinion of the circuit court of appeals for the fifth circuit considers the questions of invention here involved. In substance, it says:

Method claim 18, taken as typical, assumes familiar apparatus and claims a monopoly on a new use of the old apparatus to achieve a result in a better way. That apparatus includes a single string of pipe lowered into the well, a packer on the string, and a valve at the lower end. These simple and well-known elements are to be used by lowering the pipe into the well with the valve closed against the drilling fluid until the packer is set, then by opening the valve to admit cognate fluid below the packer, then by closing the valve so as to prevent the drilling fluid from entering when the packer is released and the pipe drawn up with its contents. No novelty and certainly no invention can be claimed for the method.

Packers and pipes with valves in them have long been in use to get what is below the packer free from what is above and without removing what is above. Whether a large quantity from a finished well or a simple sample from an unfinished well does not materially alter the method. Water has always been encountered in oil wells; the drilling fluid is only very muddy water voluntarily put and kept in the well for special reasons. Expansible and removable packers with pipes through them to reach the oil, gas, or other de-

sired fluid beneath and rat-hole packers set by the weight of the pipe pressing them down and removable by simply lifting them are shown in earlier patents.[7]

The simplicity of the method in suit along with all its operations, was reasonably disclosed in the old patent to Franklin. There is the single pipe with a packer mentioned, but function esteemed so familiar as to need no emphasis, capable of being lowered into and withdrawn from a well, with the entrance into or escape from the pipe to be controlled by a valve operated from above while the pipe is lowered or withdrawn. The importance of Franklin to this method claim is that he describes the use of a packer on a single string of pipe with a valve in the pipe in the very operation of putting them in and taking them out of the well. Franklin discloses a packer. Evidently one must be used for without it oil would not flow through the pipe as desired and there would be no use of the valve to control the flow. The packer is necessary to prevent escape of gas and to build up pressure to make the oil flow.

Franklin did not intend to get a sample by raising the pipe, but intended to keep from getting a sample by making the valve a leaky one that would let the contents escape as the pipe is raised. He expected to get what was below by natural flow just as Simmons, applicant for the patent in suit, says that is to be preferred. It would be no invention to substitute a valve that would not leak for one that was intended to and does leak on withdrawal. It would be no invention to use the Franklin device to sample a well instead of using it to flow the well. Especially after the disclosure of Cox and Edwards in the art of testing by sample taken through the drill stem with their somewhat complicated devices, recurrence for this new use to what is in substance the simple apparatus of Franklin ought not to be the foundation for the broad method claims here put forth. While perhaps not anticipated, they involve no such invention as entitles to monopoly.

The apparatus claims have a different status. They propose a new machine to better accomplish the useful result. They were rewritten to state for the first time that only a single string of pipe is to be used. In view of the oil well art, the omission of the Edwards second pipe to maintain circulation involves no such inven-

[7] The opinion refers to Stewart, No. 171,589, December 28, 1875; Stewart, No. 230,080, July 13, 1880; Koch, No. 208,610, October 1, 1878; Bloom, No. 785,933, March 28, 1905; McCready, No. 1,522,197, January 6, 1925; and Cooper, No. 1,000,583, August 15, 1911.

tion as to give a monopoly of all single string testers as is here claimed. It may be a simplifying improvement on which to rest a combination patent but it is not a basic and pioneer invention. Positive pressure of the packer against the well walls, also written into the claims, appears to refer to the weight of the pipe on the rat-hole packer, but that is the way a rat-hole packer has always worked. The claims in suit can not be sustained in all their breadth but must be limited to the form of the apparatus disclosed.

The circuit court of appeals for the ninth circuit, upon considerations in substance the same as those suggested in the opinion of the circuit court of appeals for the fifth circuit, held that the apparatus claims of the patent in suit were anticipated by the patent to Franklin. But, holding that invalidity of apparatus claims does not negative discovery of method or process, that court in substance said:

The Franklin patent directs the pipe to be lowered into the well and the valve to be operated by movement of the pipe so as to control the flow of oil. It teaches that the tube can be kept empty by closing the valve while it is being lowered and that it should be closed prior to its removal. The device is to be used in a flowing well which, of course, contains no drilling fluid. At the time of that patent the rotary method of drilling was unknown. Its purposes were to provide a method of keeping the tubing closed while being lowered into or removed from the well and means of temporarily closing the tubing to allow the gas in the well to obtain sufficient head so that the well would flow. There is disclosed no use for taking entrapped samples from unfinished wells containing drilling fluid. There is no suggestion of this last step of the patented process; the device was evidently intended to be permanently attached to the tubing of the well.

Simmons, applicant for the patent in suit, faced the problem of providing a method of testing an oil well without removing hydrostatic pressure necessary for support of the formation in question. He met it by a method operating so quickly that the suspension of the circulation of drilling fluid was not substantially greater than that frequently necessary in drilling operations. Franklin neither considered nor solved this problem.

The Simmons discovery constituted invention. It disclosed what had not been thought possible in the art, that is, that such a device could be set in a well containing drilling fluid not in circulation

long enough to make the test; it substituted a much better process than had been in use. The discovery was that a well could be safely tested by lowering a single string of pipe equipped with a valve packer and strainer and that it was not necessary to set the casing permanently and bail out the drilling fluid; or, if a test were attempted without permanently setting the casing, it was not necessary to provide an extra string of pipe for circulation of the drilling fluid.

1. Plaintiffs, insisting that the apparatus claims are not invalid for lack of invention, emphasize the fact that the Franklin apparatus was intended to be used to govern flow of a finished well and not for testing productivity of formations encountered in drilling; they maintain that it is not adapted to the last mentioned use without significant changes and they suggest that even a very slight change is enough to give patentability to the changed apparatus if the change is foreign to the purposes of the Franklin apparatus and dictated by those of the apparatus in suit. They say that the essential features of the latter, not found in the Franklin patent, are a packer so related to the inlet that it may seal off the formation to be tested from the hydrostatic pressure of the mud-laden fluid standing in the well during the testing operation, a valve so positioned with respect to the packer inlet that when closed it will entrap the entire flow of the cognate fluid to result from natural pressure in the formation when relieved from pressure of the drilling fluid, and so constructed that it will hold and bring to the surface the entrapped sample uncontaminated and undiminished.

The specification of Franklin's patent states that his invention consists in providing a device which can be connected with the tubing of the well above a "packer." On ample evidence, the trial and appellate courts found that packers to separate the producing strata from the others were old in the art, and that the use of a packer, substantially as the same exists today, is necessarily implied from the language of the Franklin patent. Detailed description by Franklin was unnecessary. *Webster Loom Co.* v. *Higgins*, 105 U. S. 580, 586.

Franklin's specification states that the device containing the valve should be "preferably . . . above the packer" and that "it may be placed deep in the well and thereby obtain considerable advantage." This indicates a valve just above the packer as is true

with respect to the patent in suit. But even assuming the contrary, in view of prior art as disclosed by the Cox and Edwards patents, the location of the valve as indicated by the patent in suit is mere mechanical contrivance and not invention. *Hollister v. Benedict Manufacturing Co.*, 113 U. S. 59, 73.

It is assumed, as claimed by plaintiffs, that the valve of the Franklin device was made so that it would let the contents of the pipe escape while it was being taken out of the well. But by mere substitution of a tight valve for a leaky one the device would be made to hold and bring up samples from the formation below the packer. The difference between the Franklin valve, leaking while being drawn from the well, and that of the patent in suit, purposely made to close tightly, is not an essential or patentable element.

In wells where there exists natural pressure in the formation below the packer sufficient to force the fluid to the surface, either device, the Franklin or the one in suit, may be used to control flow of the well and so disclose the productivity of that stratum. It is equally plain that, in the absence of adequate pressure to carry to the surface, the Franklin device with a valve effectively closed would, if operated in accordance with the method claimed in the patent in suit, similarly receive, hold, and bring to the surface samples from the formation.

The apparatus claims are invalid.

2. As used in the statute,[8] "useful art" includes method which in this case is used interchangeably with process; "machine" includes apparatus.[9] Having held the apparatus not new, we come to the question whether claims 8 and 18 cover any new method or process.[10] These claims relate to "a method of testing." The claims relating to the device call it an "apparatus for testing." In the method claims[11] and in some relating to apparatus,[12] the phrases just quoted are followed by identical words: "the productivity of a formation encountered in a well containing drilling

[8] 35 U. S. C. § 31.

[9] Corning v. Burden, 15 How. 252, 267.

[10] See Risdon Locomotive Works v. Medart, 158 U. S. 68, 77, 79. Expanded Metal Co. v. Bradford, 214 U. S. 366, 383. Tilghman v. Proctor, 102 U. S. 707.

[11] Claims 8 and 18.

[12] Claims 13, 14, 15, 16, 17, 19.

fluid."[13] The elements to be employed in taking the steps constituting the method are essentially the same as those constituting the apparatus. The process consists of "lowering an empty string of pipe," "setting the packer," "opening the valved inlet," "closing the valved inlet," "raising the pipe so closed to remove an entrapped sample and the packer from the well." The result to be achieved by the method claimed to be new is precisely the same as that for the attainment of which the apparatus found to be old was contrived.

As already shown the Franklin apparatus served to bring out uncontaminated the oil yielded by the stratum below the packer. The method practiced by its use includes in the same order all the steps, except the last one, that constitute the process in question. That step is the raising of the pipe containing the entrapped sample. As the Franklin device was to control flow and not to

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13 To show identical subject matter in the two sets of claims, defendants present an analysis of method claim 18 and apparatus claim 19 in parallel arrangement as follows:

18.	19.
A method of testing the productivity of a formation encountered in a well containing drilling fluid involving	An apparatus for testing the productivity of a formation in a well containing drilling fluid, comprising
the insertion of *only a single string of pipe* into the well to make a test,	*a string of pipe*
which includes lowering *a test string* into the well through the drilling fluid .	[*a string of pipe*] to be lowered into the well through the drilling fluid to adjacent the formation . . . and to be raised out of the well to remove the entrapped sample, . . .
with *a packer* carried by *the string* and a *valve inlet* at the lower end of the *string* closed against the entrance of fluid from the well,	*a packer* carried by *the pipe* as the pipe is lowered into the well . . . *an inlet* to *the pipe* communicating with the well below the point at which *the packer* seals off the well,
setting *the packer* above the formation : . .	[*the packer is*] adapted to be seated by manipulation of *the pipe* to seal off the well above the formation, *said packer* adapted to be positively pressed against the walls of the formation to seal off the same,
closing *the valve* to prevent the subsequent entrance of fluid from the well through *the inlet* and releasing *the packer*, and raising the test string with the inlet closed against entrance of fluid from the well to remove an entrapped sample.	and means for controlling *the inlet* to permit fluid from the formation to enter *the pipe* while *the packer* is set and to prevent fluid from entering *the pipe* after *the packer* is released and *the pipe* is being raised out of the well [to remove the entrapped sample].

test productivity of strata reached before completion of wells, the final movement to be taken in the process under consideration was not involved or described. But that movement is substantially disclosed by the Cox and Edwards patents. No discussion, in addition to the convincing exposition by the circuit court of appeals for the fifth circuit, is required to show that the method claimed in suit was clearly indicated in the prior art. It cannot reasonably be held that anything more than mechanical skill of men familiar with known methods of obtaining oil from formations below packers would be required to suggest the raising of the pipe containing fluid entrapped and held by effective closing of the valve.

The method claims are invalid.

The part of the decree of the circuit court of appeals brought up by defendants' petition is reversed. The part brought up by plaintiffs' petition is affirmed. The decree of the district court is affirmed.

It is so ordered.

The CHIEF JUSTICE took no part in the consideration or decision of this case.

A true copy.

Test:

Clerk, Supreme Court, U. S.